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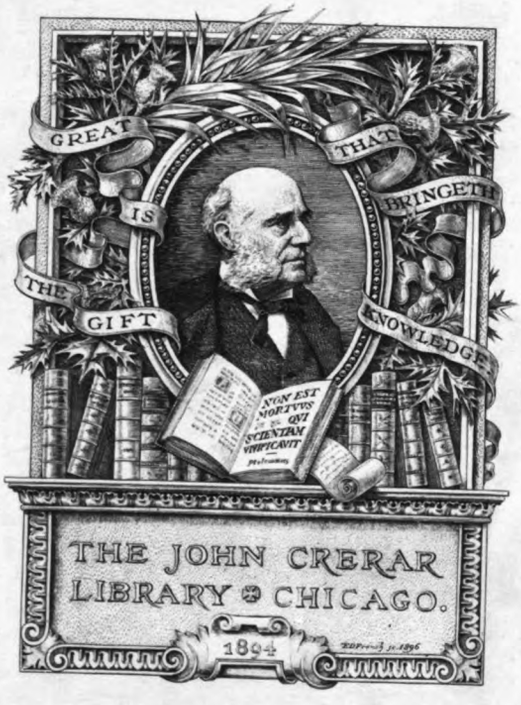
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NUMBER 206 CHICAGO, JANUARY, 1922 Price 25 Cents

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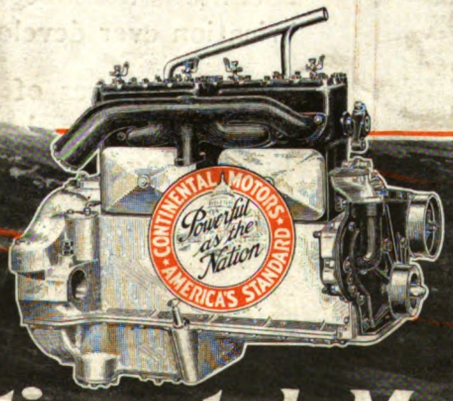

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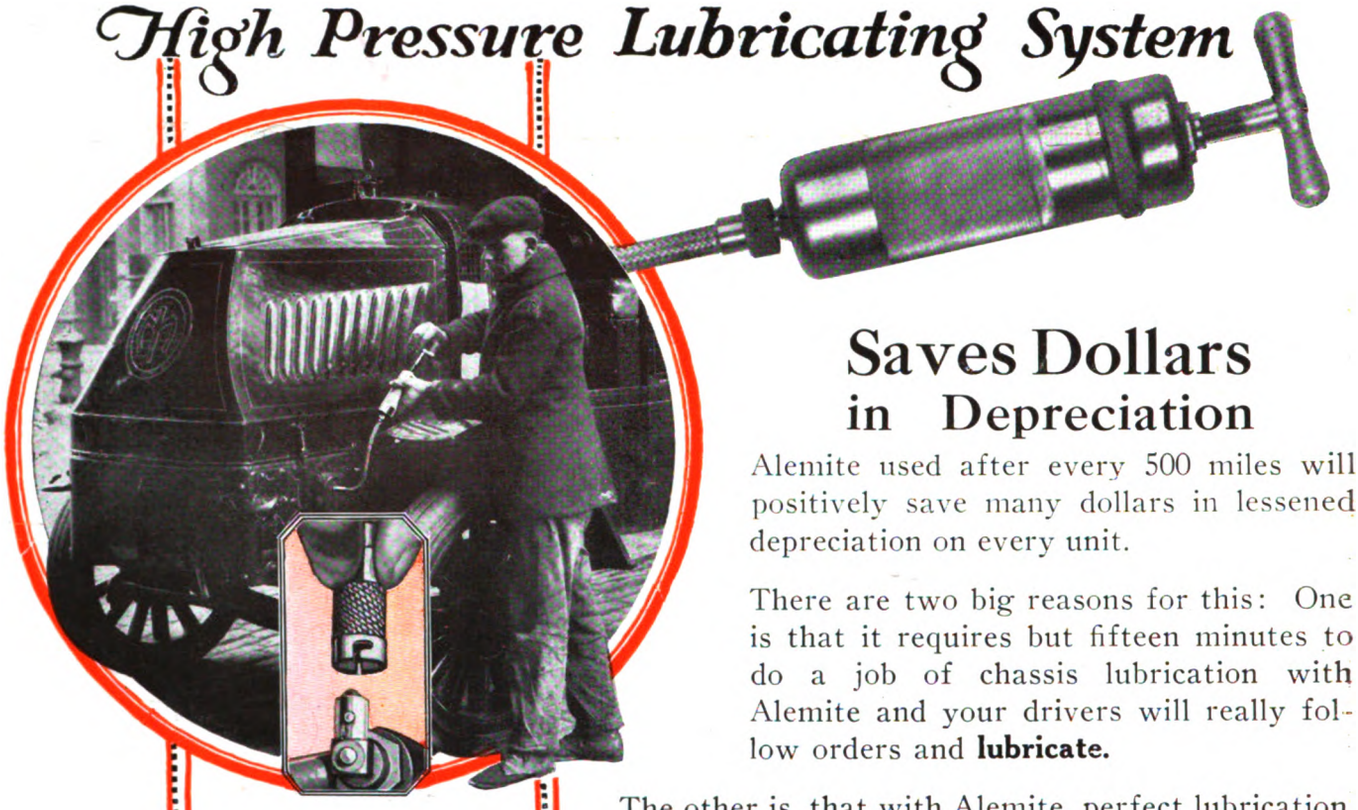

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Alemite used after every 500 miles will positively save many dollars in lessened depreciation on every unit.

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Alemite is the most efficient method of chassis lubrication ever developed.

Over 150 makes of cars, trucks and tractors are standard equipped with Alemite High Pressure Lubricating Systems. The next truck you buy should be so equipped. If your present truck is not, get in touch with the Alemite distributor nearest you. There is an Alemite Station in every large center.

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Just slip the handy bayonet-slot coupling on the ball-check fitting, give an eighth turn, where it locks. Give the handle of the Compressor a turn or two and a pressure of 500 pounds is exerted, absolutely forcing old grease out and new in.

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Now—A Complete Line of Specialized Trucks for Every Service—at Lowest Prices

Transport Truck Company now equips dealers to meet every trucking demand in the world—with a truck specialized for each duty from fast, light delivery to the big, rugged 5-ton job—at prices unmatched by any other line approaching Transport quality.

Six New Models—at New Low Prices

Model 15, Rapid Transport, fast one-ton speed job, equipped with pneumatic tires, electric lights and starter, seat, windshield, fenders and running boards $1295

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Model 55, 3-ton capacity (same equipment as Model 35) . . . $2385

Model 60, 3½-ton capacity (same equipment as Model 35) . $2585

Model 75, 5-ton capacity (same equipment as Model 35) . . . $3485

Transport's 1922 models are products of the combined talent of specialists—every part made in a factory specially equipped for its manufacture—by men specially trained—and co-ordinated into the finished product in Transport's exclusive truck factory—by Transport workmanship, the superiority of which is shown in every phase of construction. These trucks are all made of new, clean stock and priced on the basis of present costs. Note the wealth of up-to-the-minute equipment which these prices include.

DEALERS: With big activities calling for more trucks every month, this is the most profitable opportunity ever offered you. The growth of Transport business is one of the wonders of truckdom, Transport dealers will tell you. The capacities, construction and equipment specifications and prices tell you much, though only a part of the value of a Transport distributing franchise. A Transport representative will call on you any time on request

Transport Truck Company, Mount Pleasant, Michigan

TRANSPORT

INTERNAL GEAR DRIVE TRUCKS

TRANSPORT TRUCKS

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In the majority of cases where a dealer sells a chassis to be equipped with a dump body and hoist he either recommends or supplies the equipment.

A motor truck is not a profitable investment unless it is kept continuously in service, and the loss to the owner is just the same whether it is laid up on account of non-performance of truck or equipment.

You can bank your reputation and that of your truck on the

Hough Mechanical Hoist

It will function every time your engine will. It will elevate any load which your truck is rated to carry and the cost of operation and maintenance is so small that it cannot be computed in dollars.

Hough Mechanical Hoist Co.

1900 Southport Ave. Chicago, Illinois

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Published monthly by

THE POWER WAGON PUBLISHING COMPANY

544 Lake Shore Drive, Chicago, U. S. A.

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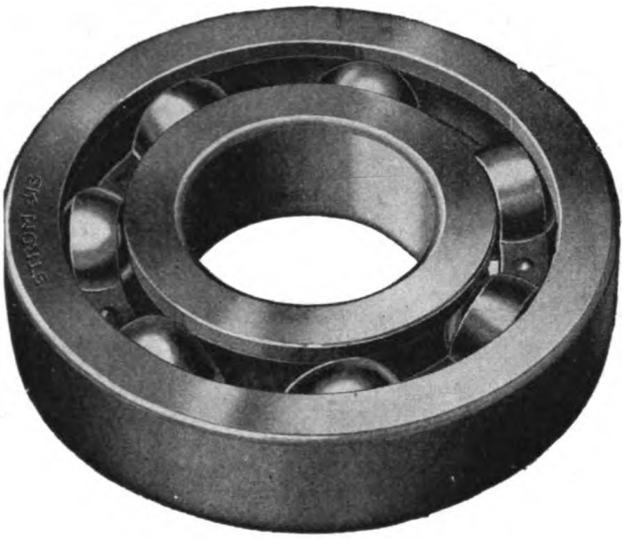

America's Foremost Trucks Use Strom Bearings

Strom Bearings deliver to the rear wheels the highest percentage of engine power because they reduce friction to a minimum.

The motor truck manufacturer who has used Strom Bearings *from the beginning* does not know what bearing trouble is.

The truck manufacturers who have improved their products by the adoption of Strom Bearings, have forgotten what bearing trouble is.

The manufacturer, who yet has to use Strom Bearings will find satisfaction in the increased *performance and endurance* of his trucks.

Let our engineering department work with you.

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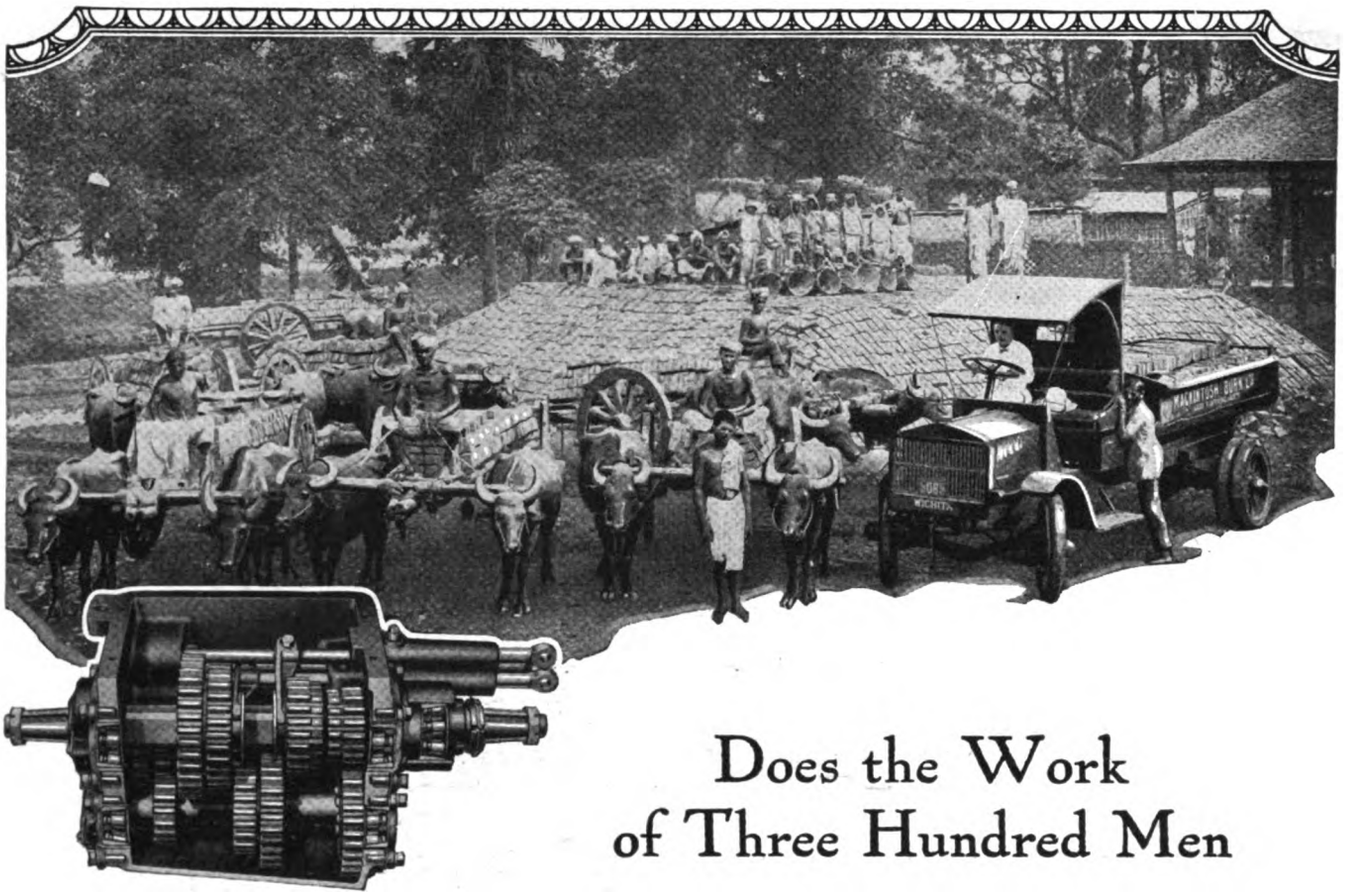

Does the Work of Three Hundred Men

This truck operating in India delivers as many bricks per day as was formerly done by twenty buffalo carts and 100 men, or by 300 basket-carriers.

The daily operating cost of the truck is $15. The daily pay of a laborer is forty cents; thus the six trucks owned by one Calcutta contractor save him well over $600 each day.

It's the sturdy, dependable units in this truck, such as its Brown-Lipe-Gear transmission, that permit regular daily service under most trying conditions and bring the big profits to the owner.

BROWN-LIPE-GEAR
TRANSMISSIONS

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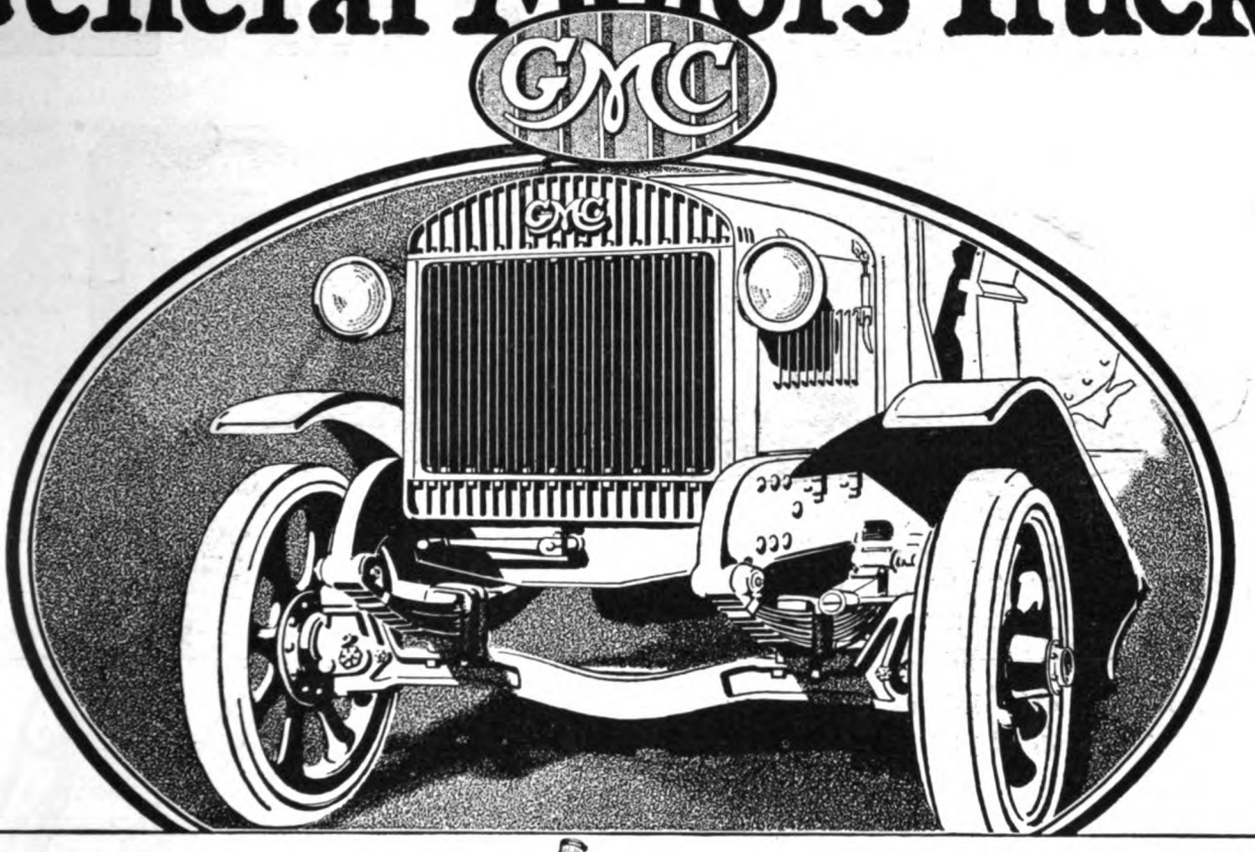
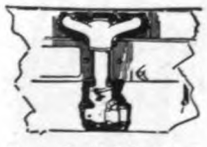
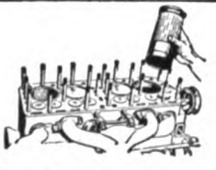
General Motors Trucks



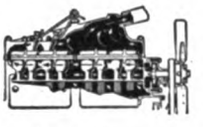


Super Heated Carburetion—*gives greater power from present day heavy fuels makes every drop of gas do more work.*

Fly Ball Governor—*governs instantly and positively to correct speed which helps prolong the life of every GMC.*

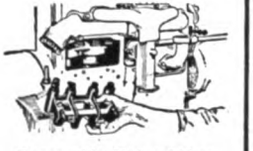


Removable Cylinder Sleeves—*prevent cylinders from getting "out-of-round"—easily replaced if ever necessary.*



Dual Cooling—*cool water continually circulates around firing chambers—warmer water surrounds all vaporization points.*

Two-Range Transmission—*develops 30% more pulling power without sacrificing speed for hauling over good roads.*



Removable Valve Lifter Assembly—*easy of access, easy to adjust, easy to replace and keep always in perfect condition.*

Get Your Share of These Profits for 1922

YOUR profits as a motor truck dealer in 1922 are going to depend upon sales.

—And sales are going to depend entirely upon whether the truck you sell can be proved an economical, reliable and efficient unit of transportation—made by a reputable, financially sound manufacturer.

For this reason GMC dealers will share in bigger and better profits.

Not only does GMC offer a complete line of motor trucks from ¾ to 5 ton capacity which fit every purpose but in addition the GMC selling organization has more points of distinct advantage because the GMC embodies selling features far in advance of the general design of motor truck building.

When a GMC dealer talks to a prospective purchaser about these trucks—when he speaks of removable cylinder walls, pressure lubrication, removable valve lifter assemblies, dual cooling and the many other features of the GMC engine that spell better and more reliable and cheaper hauling—

When he talks of the two range transmission that combines both speed and pulling power in a single truck chassis—

When he speaks of all these and other GMC features; he has sales material his competitors find difficult to refute.

Then why not be the one man in your town who has these things to offer.

As even further assurance of success, GMC dealers know that they represent a product and an institution which has made good with the public over a long period of years and which will continue in business in the years to come.

Write us today and get further information as to what GMC offers a dealer in co-operation and possible profits.

GENERAL MOTORS TRUCK COMPANY
Division of General Motors Corporation
PONTIAC, MICHIGAN

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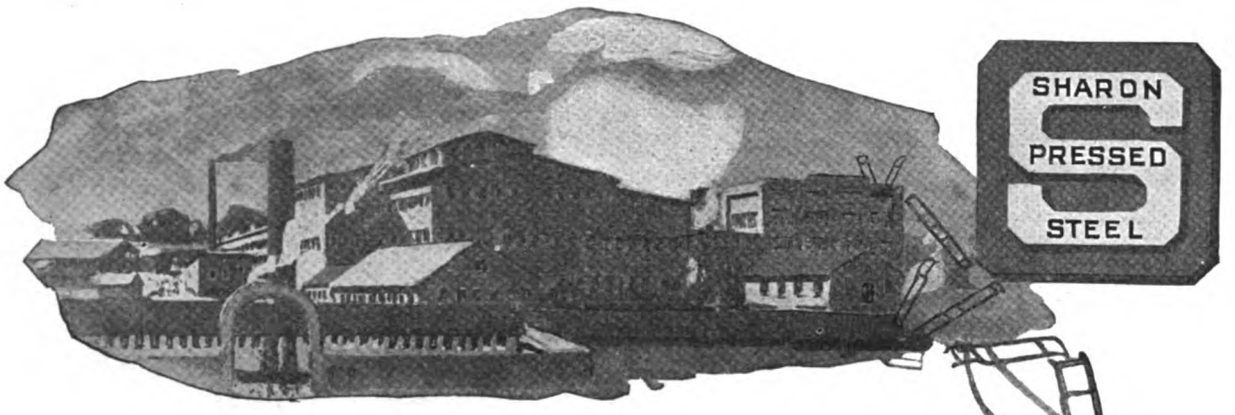

PERFORMANCE, in a car or truck, must be an in-built quality resulting from the perfect co-ordination of hundreds of vital parts. Sharon Frames furnish the back-bone of the high-duty performance of thousands of high-duty cars and trucks—the builders of which know that Sharon Quality matches their own and that Sharon Service assures them delivery on schedule time in whatever quantity needed. A Sharon-equipped car or truck is a better, more dependable, more serviceable car or truck—because it embodies the best that Sharon Facilities and Experience can afford, combined with the best that the car or truck builder can produce. Let our engineers work with yours.

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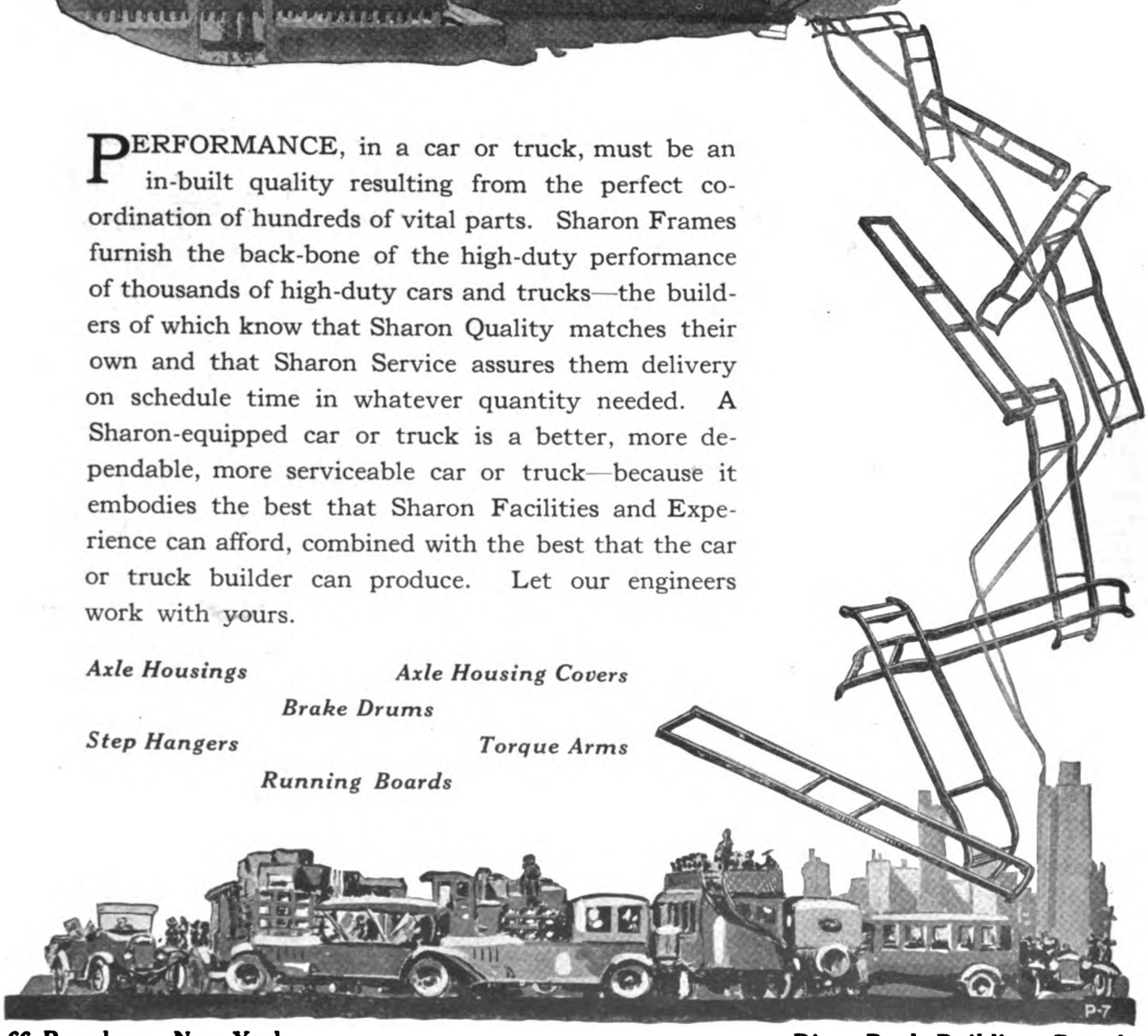

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Dealers will find it decidedly interesting to make a study of the present position of **International Motor Trucks.** Factors like the following point the way to probabilities for 1922:

—the setting of production records during the past year **(among all trucks and in a most difficult year);** last fall International production was causing general comment in the industry.

—the steady growth of International truck sales to a position among the few leaders.

—the phenomenal popularity of Internationals in all lines of business.

—the backing of International Service, which has been developed to a degree of usefulness **absolutely unequalled.**

The Full Line of Internationals, ranging from the 1,500-lb. Speed Truck to the 10,000-lb. heavy-duty unit, comprise eleven sizes at prices which enable the dealer to offer **all prospects** the maximum in hauling investment. Many dealers have found in the **International Motor Truck** contract the road to profitable, substantial success. May we send you further details? Write to the Chicago office.

INTERNATIONAL HARVESTER COMPANY
of America
(Incorporated)

CHICAGO **U S A**

Branch Houses in 92 Principal Cities

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We are ready
1922
New Models—New Prices
Effective January 3d

Standard 1½–2 ton Autocar

Overall capacity, 11,000 lbs. (Chassis, body and load)

Type F, 97-in. wheelbase, 2 cylinder motor $1950
Type G, 120-in. wheelbase, 2 cylinder motor . . . $2050

Unladen Chassis weight: Type F, 3600 lbs.; Type G, 3700 lbs.

New 2 ton Heavy Duty Autocar

Overall capacity, 14,000 lbs. (Chassis, body and load)

Type H, 114-in. wheelbase, 4 cylinder motor . . . $2950
Type K, 138-in. wheelbase, 4 cylinder motor . . . $3075

Unladen Chassis weight: Type H, 5200 lbs.; Type K, 5350 lbs.

New 5 ton Heavy Duty Autocar

Overall capacity, 22,000 lbs. (Chassis, body and load)

Type Y, 120-in. wheelbase, 4 cylinder motor . . . $3950
Type B, 156-in. wheelbase, 4 cylinder motor . . . $4100

Unladen Chassis weight: Type Y, 7200 lbs.; Type B, 7400 lbs.

THE AUTOCAR COMPANY, Ardmore, Pa., Established 1897

Autocar

Wherever there's a road

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POWER WAGON

Vol. XXVIII. CHICAGO, JANUARY, 1922. No. 206.

N. A. C. C. Takes Stand Against Truck Overloads

OVERSPEEDING IS ALSO CONDEMNED

The National Automobile Chamber of Commerce, at its recent meeting, placed itself definitely on record as opposed to the overloading and overspeeding of motor trucks. The action was the result of ruling by the Connecticut authorities to the effect that anyone-desiring to register a motor truck as of a greater capacity than that assigned to it by its manufacturer could do so by obtaining from the maker of the vehicle a certificate stating that the machine is capable of carrying more than its rated capacity would indicate. The chamber's action took the form of the following resolution:

Whereas, The National Automobile Chamber of Commerce has consistently opposed the overloading and overspeeding of motor vehicles for the safety of the public, the protection of the investment of the operator, and the protection of the reputation of the manufacturer, and

Whereas, The National Automobile Chamber of Commerce is convinced that it must continue to oppose the overloading and overspeeding of motor vehicles for the protection of the public highways over which such vehicles operate, and for the protection of the motor vehicle industry against restrictive legislation practically prohibiting the economic operation of motor vehicles—particularly the operation of trucks engaged in

(*Continued on page* 11.)

November Automotive Exports

November, 1921, exports of motor trucks, passenger-cars and parts showed a decrease as compared with those of October. Exports of trucks fell off more than one-fourth and passenger-car shipments one-tenth, while motorcycle exports increased 13 per cent. in number. The average value of the trucks decreased 12 per cent. for the complete machines and 43 per cent. for the chassis, while a slight increase in the unit value of cars was evident. The gross figures follow:

	November, 1921.		October, 1921.	
Item.	No.	Value.	No.	Value.
Motor trucks	427	$ 364,394	595	$ 755,096
Complete.	226	192,094	254	244,669
Chassis ..	201	172,000	341	510,427
Passenger-cars	2,075	1,847,190	2,329	1,952,641
Complete	1,616	1,509,143	1,791	1,621,471
Chassis ..	459	338,047	538	331,170
Parts		2,546,424	...	2,702,002

Total exports of trucks and cars in November showed a decrease of approximately 80 per cent. as compared with the same month of 1920, while their value decreased about 90 per cent.

The best market for high-priced trucks seems to be Canada; for low-priced trucks, the Netherlands and Japan. The largest purchasers of trucks with respect to numbers were as follows in the order named, each country having imported the number of trucks shown after its name: Mexico 95, Japan 52, British Oceania 44, Canada 43, Netherlands 29, Philippine Islands 18. The value of the trucks exported to these countries follows: Mexico $94,525, Japan $28,-810, British Oceania $54,393, Canada $74,-101, Netherlands $12,675, Philippine Islands $14,655.

Figures on November Motor Trade

The normal seasonal falling off in motor vehicle unit and equipment transactions is reflected in the November trade figures made public by the Motor & Accessory Manufacturers' Association. During November purchases of parts, units and accessories by the truck and car manufacturers, from approximately three hundred unit and equipment manufacturers, fell 13 per cent under the October figures. This trend is counterbalanced by the encouraging decrease of almost 4 per cent in the totals of past-due accounts. However, the totals of notes outstanding shows an increase of 5.73 per cent. The drop in the past-due accounts is particularly encouraging in view of the fact that this curve had shown an upward tendency during September and October.

The percentage changes for the last ten months are:

Month.	Purchases.	Past-Due Accounts.	Notes Outstanding.
Feb.	.66.15% Inc.	17.07% Dec.	39.08% Inc.
March.	93.30% Inc.	16.57% Dec.	16.38% Dec.
April	.32.93% Inc.	4.49% Dec.	5.94% Inc.
May	..00.13% Inc.	15.64% Dec.	16.77% Dec.
June	..15.19% Dec.	4.79% Inc.	10.37% Dec.
July	.. 1.68% Inc.	10.79% Inc.	7.90% Dec.
Aug.	. 1.31% Inc.	17.06% Dec.	5.30% Dec.
Sept.	. 1.09% Dec.	00.22% Inc.	5.24% Inc.
Oct.	.. 4.70% Dec.	3.54% Inc.	5.82% Dec.
Nov.	..13.85% Dec.	3.56% Dec.	5.73% Inc.

New Truck Prices

The following changes in chassis prices have been announced since the issuance of the last number of POWER WAGON:

Truck.	Old Price.	New Price.	Reduction.
Autocar, 2-ton	$2,300	$1,950	$350
Autocar, 5-ton	4,350	3,950	400
Corbitt, B, 2½-ton ..	3,300	3,000	300
Corbitt, A, 3½-ton ..	4,100	3,800	300
Corbitt, AA, 5-ton ..	5,000	4,500	500
Denby, 31, ¾-ton...	1,625	1,485	140
Denby, 33, 1½-ton...	2,300	2,145	155
Denby, 34, 2 -ton...	2,600	2,395	205
Denby, 27, 4 -ton...	4,200	3,895	305
Denby, 210, 5 -ton...	4,850	4,295	555
Denby, 214, 7 -ton...	5,500	4,945	545
Garford, 1¼-ton	2,090	1,990	100
Garford, 2-ton	3,190	2,750	340
GMC, K41, 2-ton	3,000	2,775	225
GMC, K71, 3½-ton ..	4,250	3,950	300
GMC, K101, 5-ton ...	4,650	4,350	300

Parts Makers Anticipate Better Business This Year

EVIDENCE IS ALREADY APPARENT

A year of keen competition, with good business for the strong companies, and greater emphasis than even before on quality products and service to the ultimate consumer—this is the outlook for 1922 in the automotive industry, according to a survey of financial executives and general managers of the principal parts and equipment manufacturers. The results of a symposium conducted by the Motor and Accessory Manufacturers' Association among its members have just been made public by M. L. Heminway, general manager.

Predictions concerning the 1922 truck and car production, and the consequent unit and accessory business, show a considerable divergence. Many of the companies report that indications in their own business point to a substantial upward trend during 1922. The figures generally given range between 20 and 30 per cent. as the expected increase, although some manufacturers look for a more profitable year without an increased volume. This attitude is based in the general reduction of overhead and the increase in productive and distributing efficiency which characterized 1921 business.

Three large and representative unit manufacturers in Detroit, making respectively bodies, radiators and springs, were the first to answer the association's questionnaire and without exception they predicted a marked improvement in 1922. The body manufacturer stated flatly that he was figuring on an increase of about 33⅓ per cent. over 1921 sales. "The outlook for 1922," said the radiator manufacturer, "is good. We believe a reasonable increase in output over 1921 will occur with those companies which are well established and giving good value in their product. The truck companies should do a considerably greater volume." From the spring manufacturer came an opinion somewhat less certain, yet strongly forward-looking and confident. "Business should be slightly better than in 1921," he said, "with credit conditions crystalizing."

A note of prudence and conservative judgment is sounded by one of the leading piston-ring manufacturers in America, a company in close touch with many of the "key" companies. This manufacturer presented the following statement:

(*Continued on next page.*)

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Truck Makers Seek to Standardize Cab Sizes

VARIETY OF BODIES AND CABS COSTLY

Owing to the large number of purposes for which motor trucks are used, it is the universal practice of all truck builders to sell them without bodies or cabs, these units being obtained by the chassis purchaser. As bodies and cabs are not interchangeable on different makes of truck of the same capacity, it is necessary for chassis buyers to place special orders for bodies and cabs, these units being fitted to the truck at the body-builders' plant, resulting in additional expense and a loss of time.

Motor truck users and body and cab manufacturers fully appreciate this most uneconomical situation, but, as the quantity production of bodies and cabs is apparently impossible owing to the variation in the amounting dimensions for the different types and makes of truck chassis, they are powerless to remedy the situation. At the suggestion of a truck manufacturer having large distributer and dealer organization, this condition is to be discussed by the truck manufacturers' committee of the Society of Automotive Engineers' Standards Committee.

The fundamental dimensions which must be standardized to obtain the desired interchangeability of cabs are the distance from the windshield to the front of the driver's seat and the width of the seat. The latter dimension has been standardized at about 20 inches in practice, but the former varies, depending principally upon the angle of the steering-column. It will probably be found necessary to establish two cab widths or seat lengths, owing to the larger crew usually carried on the heavier trucks and also to appearance. Instruments will probably be attached to a dash furnished as a part of the chassis. This would save a large amount of time in equipping trucks with cabs, as no instrument connections would have to be disturbed.

The location of the pedals and the levers involves difficulties so far as standardization is concerned and a great deal of study will be required. The standardization of the location of the pedals and levers is not absolutely necessary, however, from the standpoint of standardizing the principal cab-mounting dimensions.

Standardization of cab dimensions will mean that the seating comfort of the driver will be assured in all cases. This is a very important point, possibly more important than interchangeability of cabs, as it would eliminate a great deal of criticism on the part of drivers who desire passenger-car comfort in motor trucks, not realizing that this is impractical at the present time. It is a point which is taken very seriously by salesmen and receives a great deal of discussion in any motor truck sale.

Hu Teh-kung, of Peking, China, has petitioned the Intendent of the Metropolis for permission to inaugurate a passenger and goods motor service between Nanyuan and Peiyuan, Peking.

Better Business This Year

(*Continued from page 9.*)

"The outlook for 1922 in the automotive industry, while brighter, does not by any means indicate a return to the unusual sales and marketing conditions which prevailed during the war, which, incidently, must be recognized by all as abnormal, and a return to normal conditions does not by any means mean a return of the conditions prevailing during or just following the recent war."

A somewhat different view is expressed by a representative sheet-metal and stamping company in Detroit district:

"There will not be any more vehicles produced in 1922 than in 1921. This, however, does not mean a dull year for the parts makers, but rather a decided improvement over 1921, as the vehicle manufacturers have virtually exhausted their stock of parts."

Particularly significant is the following analysis, for it comes from a Michigan company, one of the two or three largest wheel manufacturers in the country:

"The outlook for 1922 is even better than the outlook was two years ago today for the year 1920. Our business has averaged 70 per cent. each month of this year as compared with 1920, and we have every reason to believe that 1922 will be considerably better than 1921 or 1920."

Two representative engine manufacturers contributed to the symposium. One replied briefly: "Thirty per cent. better than 1921." The other went into greater detail: "It is our feeling that there will be from now on a gradual but slight improvement in general business conditions so that, by July, 1922, we may hope for what may be a 50 per cent. of normal production. We doubt very much whether the production as a whole at the time mentioned will exceed the percentage stated."

One of the most illuminating statements comes from a manufacturer in Cleveland making a line of various units:

"The outlook for 1922 is almost as vague as it was for 1921, at this time a year ago. There is, however, a healthier and more optimistic feeling abroad. We have learned to know who are the strong companies in the industry and who are the weak ones. Some of those we thought weak have proved to be exceptionally strong, and vice versa. The outlook for strong companies for 1922 is good. We do not think, however, that 1922 is going to show much more motor business than 1921, and we are trimming our sales accordingly. Our reasons for this are many; chiefly, that there has been no increase in business that would place new money in the hands of the buyers or that would place dividend money in the hands of investors, and until this is done, there will be no new buying to speak of. We believe 1922 will not be worse than 1921. We believe it will be somewhat better and gradually become more so."

In the fiscal year ended August 31, 1921, the Packard Motor Car Company manufactured 6,469 passenger vehicles, 1,386 motor trucks and 51 aircraft motors. In the same period the company sold 6,451 cars, 2,351 trucks and 50 aircraft motors.

Canada Requires Marking of Imported Manufactures

COUNTRY OF ORIGIN MUST BE SHOWN

The Canadian Commissioner of Customs has issued regulations and instructions covering the application of the new rulings which require the marking of goods imported into the Dominion. The rules call for the marking of each article or each package with the name of the country of origin so that the proper schedule of tariffs can be applied. The following paragraphs indicate the nature of the marking required on articles produced and exported by the automotive industries:

Automobiles, motor-cycles, motor trucks, tractors, bicycles—each article.

When not exempt under section 18 (see below):

Battery boxes, tool boxes, spark-plugs, carbureters, ignition distributers, starter generators, fan belts, wheels, steering-wheels, lamps—each article.

Ball-bearings, roller-bearings, brake-lining, transmission lining, piston-rings, spark-plug insulators, rim wedges, rim clamps, frame and body lining, gaskets, shims, power belting, rebound straps, tire straps—each carton or container.

Radiator laces, hood laces—on a tag or string ticket.

Babbit metal—no marking.

Indication of the country of origin, wording of:

The following are specimen indications of the country of origin which are approved when applied to an article or commodity with which the term is appropriate: "Printed in England," "New Zealand Produce," "Country of Origin—New Zealand," "Grown and Packed in California, U. S. A.," "Grown and Packed in U. S. A."

The following are specimen indications of the country of origin which are not approved: "Manufactured by the Jones Co., London, Eng.," "Sheffield," "New York, U. S. A.," "Limoges," "Packed in Ceylon," "London Made," "British Manufacture," "Unis France," "Prepared and Packed in U. S. A.," "British Products," "England," "Made in Eng.," "Made in America."

Section 18. The following goods will not be required to be marked with the indication of country of origin, viz.:

I. Metallic goods which are not intended for sale to the consumer in the condition imported, but which are merely raw material for use in the manufacture of articles in Canada; crude rubber, crude clay, hides and skins, raw furs, corkwood, unmanufactured, marble and stone in the rough, broom corn and bristles, fiber, rags.

II. (a) Partly manufactured materials to be further manufactured or finished in Canada before passing to the consumer.

(b) Completely manufactured parts for incorporation into articles of Canadian manufacture before passing into use by a consumer.

(c) Provided that there shall be incurred in Canada at least 25 per cent. of the total cost of production of the article going into consumption in Canada into the manufacture or construction of which such raw material or partly or completely manufactured materials or completely manufactured parts shall have entered.

(d) Partly or completely manufactured parts for use as repairs to articles made in Canada or imported and already indelibly marked with other country of origin.

And provided that on every entry at customs of goods as described in this section a statement shall be placed by the importer certifying to facts sufficient to classify the importation with the provisions of this section.

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Dealers Suggest New Terms for Distributer Agreements

COVER ALLOTMENT AND CANCELLATION

Following a number of meetings of representatives from the National Automobile Dealers' Association with those from the National Automobile Chamber of Commerce, the directors of the latter body have just transmitted to motor vehicle manufacturers certain suggestions for changes in contracts which the dealers believe will prove mutually beneficial in the distribution of machines. They have to do with the allotment of motor vehicles and cancellations. While these changes proposed by the dealers are suggestions only, they are, in the opinion of the N. A. C. C. directors, proper ones for consideration by those who manufacture and distribute motor trucks and cars. The text of the proposed changes follows:

Allotment of Motor Vehicles.

(1) The distributer must furnish to the manufacturer an order for motor vehicles for the period of twelve months in advance for distribution in his territory, covering the allotment of models by months. The manufacturer may ship motor vehicles according to such statement, unless the distributer shall notify the manufacturer from 60 to 90 days in advance of a change in the shipping schedule for any month or months. By the giving of such notice unfilled shipments may be automatically cancelled, provided, however, that every distributer must, during each quarter of the contract year, take at least 50 per cent. of his aggregate order for such quarter.

(2) If, for any reason, the manufacturer does not ship during any month the orders specified for that month, such unshipped orders for that month may be automatically cancelled by the manufacturer and be deducted from the allotment to the distributer as specified for that month and in such case the manufacturer and distributer will be released from any further liability for such month on such unfilled order.

(3) Any orders submitted by the distributer in excess of the monthly allotment as above provided, may be accepted by the manufacturer at his option, and when so accepted shall be deemed to be subject to all the conditions to which motor vehicles ordered by annual allotment are subject.

Cancellation.

(4) This agreement shall remain in force and effect until cancelled or terminated with or without cause by the giving of notice by either party to the other party in writing of 15 to 30 days and at the end of the time specified in such notice this agreement shall be deemed to be in all respects cancelled and terminated.

(5) In the event of a cancellation or termination of this agreement such cancellation or termination shall be the act of a corporate officer, sales manager or other person duly authorized to cancel or terminate sales agreements.

(6) It is agreed that in the event of the cancellation or the termination of this agreement by the manufacturer that said manufacturer obligates himself to repurchase, at the net prices originally charged to the distributer, the distributer's stock of new saleable cars of regular models of the current serial year shipped by the manufacturer within six months before, and such parts as were originally purchased by the distributer from the manufacturer, which cars or parts are in the hands of the distributer at the date of said cancellation by the manufacturer.

(7) In the event of the cancellation of this agreement by the distributer the manufacturer at his option may purchase such stock of new motor vehicles or parts, sold by him to said distributer and on hand at the date of the cancellation or termination of this agreement by said distributer.

(8) It is agreed that the distributer shall furnish the manufacturers semi-annually in each contract year an inventory of parts on hand and shall return such parts to the manufacturer as may comprise an overstock in the hands of the distributer or which the manufacturer has declared to be obsolete.

The above suggestions also apply to agreements between distributer and dealer.

N. A. C. C. Against Overloads

(*Continued from page* 9.)

the transportation of people and product, and

Whereas, certain states have enacted laws permitting the registration of motor vehicles with a carrying capacity in excess of the manufacturers' rated carrying capacity upon the production of a certificate from the manufacturer that such motor vehicle can be "safely operated" "under all conditions," "at all times," and some manufacturers have given such certificates, and

Whereas, it is the conclusion of the National Automobile Chamber of Commerce that the giving of such certificates authorizing the carrying of loads in excess of the rated carrying capacity of such motor vehicles, under the conditions of such laws, is dangerous because of: first, contingent liability on the manufacturer in case of accident; both personal liability and property damage; second, claims under the manufacturers' warranty for breakage and defects resulting from overloading authorized by such certificates; third, for the far more important reason that the acquiescence of motor vehicle manufacturers in overloading will be immediately seized upon by legislators as a basis for further restrictive legislation and higher license fees, and will immediately deprive the manufacturers of the coöperation of the Bureau of Public Roads of the Department of Agriculture, the state highway commissioners and public road officials, in their attempt to reach a practical solution of the highway problem in its relation to motor vehicle transportation; and fourth, the granting of certificates by manufacturers permitting overloading violates not only every engineering and manufacturing principle, but every principle of clean, competitive selling, and can only result in misunderstandings and sales resistance, as having once departed from a national understanding and enforcement of the manufacturers' rated carrying capacity, there is no limit on overloading that can be accepted as a standard.

Now, therefore, be it resolved, that the National Automobile Chamber of Commerce hereby reaffirms its policy of being unalterably opposed to overloading and overspeeding of motor vehicles and that it condemns the practice of giving certificates authorizing the loading of motor vehicles beyond the manufacturers' published rated carrying capacity, and urges its members to discontinue the granting of such certificates, and be it

Further resolved, that the National Automobile Chamber of Commerce continue to co-operate with the Bureau of Public Roads of the department of Agriculture, the State Highway Commissioners and other public road officials, in stamping out the overloading and overspeeding evil for the safety of the public and the protection of motor vehicle transportation over the highways, and be it

Body-Builders Will Hold First Annual Exhibition

KNOCK-DOWN TRUCK BODIES FEATURED

Plans are going rapidly forward on the first annual body-builders' show, to be held in New York City the week of January 9-14, by the Automobile Body Builders' Association. Among those who will exhibit are: F. A. Ames Co., Owensboro, Ky.; Amesbury Specialty Co., Amesbury, Mass.; H. A. Babcock Co., Watertown, N. Y.; Bender Body Co., Cleveland; Fleetwood Metal Body Co., Fleetwood, Pa.; FitzGibbon & Crisp, Trenton, N. J.; Holbrook Co., Hudson, N. Y.; Home Body Corp., Boston; Martin-Parry Corp., Indianapolis; Metropolitan Body Co., Bridgeport, Conn.; Milburn Wagon Co., Toledo, O.; Newman Commercial Body Co., New York; Smith-Springfield Body Co., Springfield, Mass.; E. J. Thompson Co., Pittsburgh; Wayne Works, Richmond, Ind.; Willoughby Co., Utica, N. Y.

This exhibit will run concurrently with the national automobile exhibit, with the Twelfth Regiment Armory as the scene of its activities. The purpose of holding such an exhibit is, first, to visualize the economic importance of the body-builders as a group; secondly, to stimulate trade and make it easier for the vehicle makers to draw up practical specifications and for the body engineers and designers to adopt the most advanced and best ideas in construction, trimming and finishing of bodies.

An educational tone promises to be lent the exhibit through the demonstration features which will be incorporated in many of the displays. The largest maker of light commercial bodies in the world has taken six spaces on the main floor, equaling 1,200 square feet, in which he will demonstrate the feasibility of his plan of shipping motor wagon bodies in sections. Four men will be constantly on hand to show the visitors how quickly and easily the entire body can be assembled and taken apart.

An advanced showing of new and standard styles of both truck and car bodies is promised. The entire central part of the main floor, which is 200 by 200 feet, will be occupied with the exhibits of bodies, while the spaces along the walls on three sides will be divided into booths ten feet square for the exhibition of materials, parts and the products entering into the fabrication of both truck and car bodies.

Stewart Price Reductions

One of the most drastic price cuts in the truck industry has just been announced by the Stewart Motor Corporation, effective January 1. The total price reductions from September, 1920, prices are as follows: $1,010 on the 3½-ton, $910 on the 2½-ton, $985 on the 2-ton, $660 on the 1½ ton, $450 on the 1-ton and $255 on the "speed" truck, which is now priced at $1,195 for the chassis. In addition to these large reductions, T. R. Lippard, president of the corporation, states that many improvements and refinements have been added, thus making the 1922 models the best the corporation has produced since its beginning in 1912.

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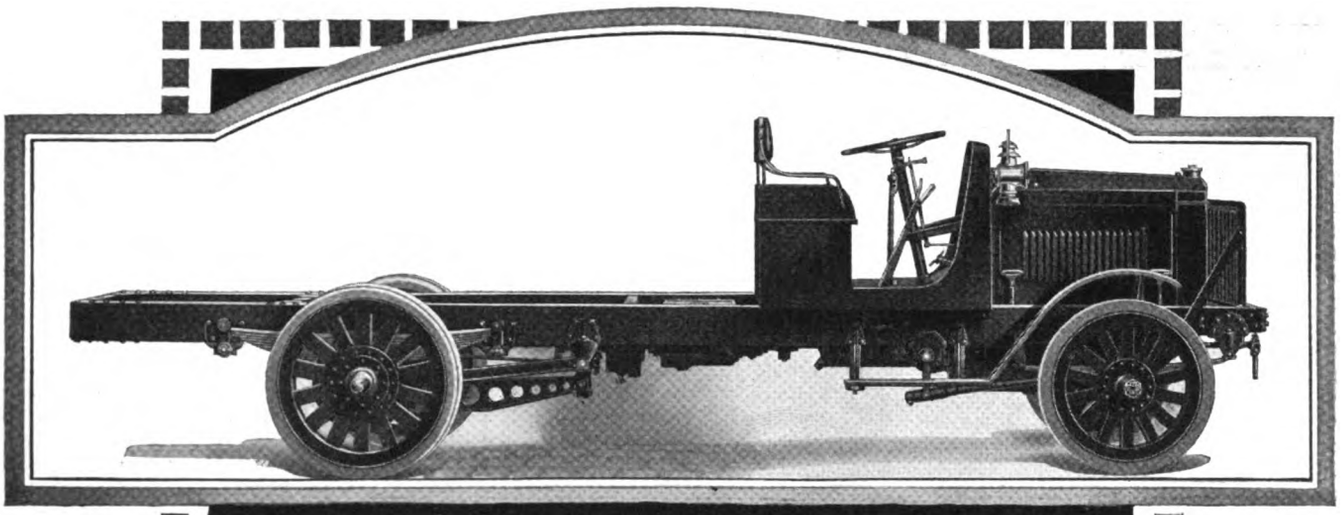

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A Normal Year

WE seriously doubt whether the year just closed will ever be forgotten by business men. Among those engaged in the manufacture and sale of motor trucks it has generally been regarded as the worst in a decade, and certainly no one can deny that it brought an unprecedented amount of anxiety and grief. There is probably not a single truck maker or dealer to whom it did not bring a rude awakening in the seemingly ruthless manner in which it contravened all plans and disappointed all expectations. And yet, if we consider the total volume of the industry's production and sales, without taking account of the difficulty with which the latter were made, we can not escape the conclusion that the results achieved were normal. The trouble lay with the trade's expectations, which, like everything else, were unjustifiably inflated.

Any business which expands at an average rate of ten per cent. per annum over a stretch of years is considered sufficiently well grounded and alluring to attract investors from beyond the seas. Yet the motor truck industry, looking back to the period before the war, has done twice as well in the matter of production and sales, while men continue to complain of the poor business of the last eighteen months. In 1914 this industry produced approximately 30,000 trucks; last year the total output was in the neighborhood of 110,000—a growth indicating an average annual increase of twenty per cent.

It has, of course, been very difficult to maintain a sane point of view of market possibilities during the last six or seven years. In that time we have witnessed the development of the farm market, which, due to war-born prosperity and transportation hardships, absorbed more than 120,000 motor trucks in the years 1918, 1919 and 1920. Between 1915 and 1918 the general expansion of commerce through feverish war activities called for no less than 200,000 machines which were hastily applied in hundreds of new lines of industry. Owing to the inadequacy of railroad transportation the business of hauling for hire grew with amazing strides, placing at least 50,000 trucks in a very necessary but, on the whole, not very profitable line of work. Motor 'bus projects made increasing demands on the industry's production facilities, taking probably not fewer than 20,000 to 25,000 vehicles, while the period of reckless expenditure which followed the signing of the armistice and infected business as well as family circles called for fully five times as many.

In these various ways, therefore, a sudden and, it must be remembered, abnormal demand for half a million machines arose, and with it came the increased competition provided by thousands of new dealers and dozen of new manufacturers, most of whom merely cluttered the field and contributed nothing of value to the permanence or stability of the industry. Indeed, their entrance into the business may be reckoned a real loss in so far as it brought confusion, unsound methods and a spirit of opportunism, which had been on the wane and would, by this time, have been well-nigh eradicated but for this influx of new and inexperienced material.

It is for these reasons that we say that 1921 was a normal year in truck production. It provided a market for all the trucks that a sound industry could rightfully have expected to sell, although increased competition and credit difficulties built up a severe sales resistance. It did not, however, provide an outlet for the maximum output of factories which had been expanded, tooled and manned for war-time production; it did not provide encouragement for a host of producers and distributers, many of whom had no prior stake in the business and were prepared to forsake it as quickly and with as little feeling as they had embraced it. It did offer, even under the general business depression of the period, a healthy demand for three times the output of 1914, and the growth is one of which the solid fabric of the trade may justly be proud.

We are not much given to pointing morals, but 1921, in our opinion, holds a wealth of wisdom for those who care to learn. It is a warning to all who would try to force the development of this industry along unsound lines and at an unsafe speed; it is likewise an encouragement to all who seek to insure the future integrity of this trade by protecting and conserving the interests of those permanent factors who have made it what it is.

The Outlook

THERE can be little doubt that this year will be one of increased business in practically all lines. The signs of the improvement have been manifest for some time, and the spirit that prevails in well-informed places is in direct contrast to that evident a year ago. But the degree of optimism now observable is based on something more than a mere wish to have things better; it is founded on the belief that conditions have altered considerably and that the trend is definitely in the direction of progress.

Encouragement is derived from many factors, such as the improvement in certain lines of business that is already noticeable; the betterment in the labor situation and the reduction in the number of serious labor controversies; the

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lower cost of living and credit; the sound position of the country's banks with their high earnings, large gold holdings, reduced loans, and the liquidation of so-called "frozen" loans; the aid given the farmers through war finance; reduced taxation; improved stock and bond prices; the betterment of transportation; the government's economy program; the development of foreign trade opportunities, the improvement in foreign exchange, the plans for an international economic congress; not to mention the apparent settlement of the Irish problem and the work of the arms conference.

These are, of course, at best nothing but general indications of recovering spirit, but in so far as they reflect general business conditions and expectations they should instill confidence in our own group. A trade, such as ours, which lives out of the prosperity of commerce at large, must not be slow in recognizing the signs of general business revival.

Selling Against the Law

LIKE every other business, which has depended for its success on the displacement of fixed investment and the supercession of inefficient and costly tools by economical and more effective ones, the motor truck industry has been forced to overcome stiff and persistent resistance in its desire to find a market for its product. And during the last few years this opposition has been strengthened by the unusual obstacles of the war and post-war periods with the results to business everywhere so apparent. Of late, however, a new form of resistance has been developed, and it threatens, because of its seemingly permanent nature, to work great harm to this trade. We allude to the increasing difficulty of selling certain types of motor trucks in the face of legislative restrictions of one kind and another.

The tendency in the framing of traffic regulations is well indicated by the changes made in the laws of certain states in the past year or two, as a result of which the fees required for registering medium and heavy-duty machines have reached absurd heights and are often sufficient to prohibit the use of such vehicles. Between the desire to increase the registration fees on one hand and the restriction of permissible loads on the other, trucks of 4-ton rating and more appear to have a very doubtful future, unless the theories underlying recent enactments are radically altered.

In many cases the levy of an exorbitant fee for the registration of a motor truck may amount to nothing more than the difference between the first costs of a moderately-priced and a high-priced machine, and it is, indeed, demonstrable, in one case as much as in the other, that the sum involved is but a fraction of the total cost of buying and operating a machine throughout its life. This contention is perfectly sound so far as the question of motor truck economy is concerned, for the machine that can not earn the expense involved in either of these items is not likely to prove a striking money-saver. However, this point is but distantly related to the problem of making sales, which is greatly increased in magnitude by the factor of price, particularly in these times.

To many prospective buyers of motor trucks, and possibly to the great majority of them, the price at which the advantages of motor service can be obtained is of great importance, and the imposition of a federal sales tax, a state gasolene tax, and a state registration fee, which alone may amount to fully half of the purchase price of the machine during its life, sets up formidable obstacles to the sale of heavy vehicles. Moreover, limitation of the load that may be carried has often made necessary the employment of more vehicles of lesser capacity in order to meet the haulage needs of the owner, and the intending purchaser can not view this possibility without grave concern.

The state of transport legislation, as disclosed elsewhere in these columns, reveals what, to our mind, is an alarming situation. When the preservation of the country's roads, which were created, let us not forget, for the benefit of transport, becomes a matter of such importance that it transcends the question of their suitability for the traffic that the growth of commerce necessitates, they had better be scrapped in their entirety. Yet that, we regret to say, appears to be the spirit behind recent state transport laws and, unless it is checked before it acquires the acquiescence of public opinion through a more widespread application, motor haulage will become a matter of carrying the nation's freight in one-ton units and truck manufacture will become a business of supplying small, low-priced machines on a very slender margin of profit. The wide field of usefulness of the heavy-duty machine is growing greater and more patent with every experiment made in applying it and legislation which seeks to restrict or prohibit its use stands squarely in the path of progress.

The Sporting Page

WHILE we should be loath to applaud the Senate bill which would make Congress the custodian of our morals through censorship of the daily newspaper's sporting page, we feel that the subject would bear looking into. Not, to be sure, with a view to the strict editing along puritanic lines of material relative to athletic and sporting activities, but rather for the purpose of seeing that a sporting page include only matter germane to the subject. And even on this point we should not be uncompromising to the extent of excluding comfort for the matrimonially-minded or those physically indisposed. We should, however, place a strict ban on business news.

The sporting page has been one of the thorns in the side of the automotive industries, ever since the time, when, through the influence of the racing enthusiasts, the motor car and the motor truck were made companions of the prize-fight and the ball-game, and many of the industry's difficulties can be traced to that source. It has been, and always will be, hard—if not, indeed, impossible—to convince our legislators of the dignity, sincerity and essential character of this business, so long as the fountain-head of the public's knowledge and the authority for the public's opinions continues to laugh at its product by classing it with "feather-weights" and "pinch-hitters."

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Merger of Body-Builders Sought by New Corporation

WOULD DIVISIONALIZE MANUFACTURE

The United Automotive Body Company, through its sales promotion manager, E. W. Windsor, has circulated among the body-builders a prospectus describing the plan for a merger of all the country's body-building interests. The new concern, according to the prospectus, will be incorporated under the laws of Delaware for $10,000,000, all common stock of $10 par value. It will take 6-months options on the plants which it decides to select and which are interested in the project, with the understanding that the company will purchase for cash, at a stipulated figure, covering the appraised assets of the companies taken in. Under this method each plant would work out its own solution to satisfy stockholders.

As a result of the adoption of the proposals made, the company expects to attain the following ends:

(1) To give the most value for a dollar of any body manufacturer in the United States.

(2) To supply the only absolutely complete line of truck bodies offered—an efficient body for every business.

(3) To supply the best and quicket service obtainable by a chain of branches or mounting stations, located at centers of the truck industry.

(4) To supply the truck dealer with any type of body mounted on any chassis complete, ready to put into service when unloaded from the freight-car.

(5) To educate every truck dealer to order from his chassis manufacturer, not only the chassis he requires, but the body of the type desired mounted and shipped along with the chassis.

(6) To have the truck manufacturer release his chassis to the United branch at his city, the body to be mounted and returned to the truck manufacturer. He ships the complete job, saving the dealer the freight on the body, inasmuch as the combined weight of the body and the chassis does not take up the minimum carload weight, which the dealer must pay, even on a car of bare chassis. The manufacturer draws a draft for the job complete and remits to the United Company.

(7) To cover all dealers in the United States and Canada and thus obtain sufficient volume of business in standard bodies to keep each factory in the organization busy in normal times, specializing on one standard type of body, which means large production, low overhead, quick turnover, uniform construction, established piece prices throughout the plant, specialized effort, and thoroughly practical and efficient bodies for the purpose for which they are designed.

(8) To handle engineering, drafts, and specifications from one office, well equipped with facilities and expert engineers and draftsmen that produce work not obtainable from the average factory engineering department, yet pro rating the cost over the factories benefited so that it will be only a small fraction of what the cost would be for each plant maintaining an inefficient and incomplete department of this kind.

(9) To take care of all purchases from the purchasing department of the general office, pooling orders for all plants, eliminating overstock of any material. Beginning with a complete inventory of all raw material on hand at each plant, the purchasing department will fill all the orders from each of the plants with stock from the other plants that are obsolete or not adapted for the production allotted them, thus reducing each factory's material on hand to only such stock as will be used for immediate production. Through the efforts of the engineering department such material as paints, varnishes, iron, lumber, panel stock, hardware, nails, screws, bolts, fabrics, etc., will be standardized, and all plants will use one manufacturer's product that has been tested and approved by the engineering department. The quantities ordered will be governed for each plant by a careful check-up on the engineering and production department for 60 days ahead, so that no overstock should occur and, if it should, it can be easily remedied the following month.

(10) To handle all sales, advertising and sales promotion work through the sales department of the general offices for the products of all the factories. The cost will be only a very small percentage of what the present aggregate cost of the same factories amounts to on sales, traveling expenses and advertising, and yet the methods will be much more effective, covering with one piece of literature, advertising that affects the sales of a score of plants, with one addressed envelope and one postage stamp to carry a message of twenty different factories instead of one.

(11) To take care of, through one fiscal department, all financing, for all units, under one name, one expense and with much quicker action.

(12) To reduce freight charges through one traffic department which will obtain commodity rates, trace shipments, and settle damage adjustments quickly.

(13) To care for, through a single legal department, all tax reports, war-tax adjustments, compensation, injury cases, insurance and other legal matters.

(14) To handle in a general way, through a centralized auditing department, all reports, audits, etc., and to formulate and install standardized forms and cost sheets.

(15) To provide a production department which shall be given over entirely to time study, piece work, progressive production, graphic control, balancing of departments, elimination of lost motion, and systemizing of each factory.

The plan has already been favorably commented upon by more than a hundred truck makers and more than thirty body-builders have signified either their interest in it or their desire to join.

The Cleveland offices of the company have been closed and executive offices have been established in Danville, Illinois, in connection with a newly acquired plant at this point. The personnel of the Ohio corporation has remained intact in the new organization of the same name. F. O. Darling continues as general manager. W. R. House, who handled the sales promotion work at the Cleveland office, and who, since July 1, has been acting as Michigan sales manager, will be made manager of branches. The latter's position in Detroit will be filled by someone prominent in the automotive field, whose selection is now under consideration. W. H. Paul will continue as Lansing branch assembly manager. E. W. Windsor, formerly assistant manager of the sales department, is now acting as dealers' service and sales promotion manager. New men in the organization are: C. E. Rupe, formerly general manager of the Champion Wagon and Waterloo Body companies, serving as factory manager; John Fixott, four years with the Traffic Motor Truck Company, is special 'bus representative; Howard O'Toole, formerly of the Moore Motor Vehicle Company, assistant superintendent in charge of the cost department, and A. H. Palm, secretary of the L. C. Graves Company, will act in the same capacity, supervising the accounting.

Substitute Burke Bill Bothers Ohio Truckmen

WOULD PROHIBIT USE OF MOST TRUCKS

Motor truck operators in the State of Ohio are worried over the prospect of enforcement of the substitute Burke bill, which provides that not more than 70 per cent. of the weight of any motor truck and its load can be concentrated on any one axle, nor more than 14,000 pounds on both wheels of one axle. As a result, the Ohio Association of Commercial Haulers, through its secretary, E. A. Mallory, is conducting a campaign against this piece of legislation. In its bulletin No. 47 the association states its position rather plainly in the following words:

"The substitute bill permits a maximum of 10 tons which includes the weight of truck and load. Now, 14,000 pounds is 70 per cent. of 10 tons and a motor truck carrying 70 per cent. of its load on the rear axle and 30 per cent. on the front axle is not engineered according to the accepted practice that gives economic results, because an excess of 70 per cent. of the weight of the truck and load is required on the rear axle of all standard makes of motor trucks for propelling traction and to overcome the resistance of the front wheels. The authority for our position is the latest edition of the *Power Wagon Reference Book*, which contains the Major Specifications of all standard makes of motor trucks. These specifications are grouped according to the brand-names of the trucks described and arranged according to their load-carrying capacity and load-rating classification. These specifications were compiled by the best and most competent engineers obtainable and the *Power Wagon Reference Book* is accepted in the United States as the standard authority on all transportation engineering questions of the present day. As engineers, road-building contractors and truck operators check up and verify these specifications, it is the general opinion that the substitute Burke bill is a piece of class legis-

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Unbalanced Inventories the Big Wasters of 1921

FUTURE BUYING MUST BE PRUDENT

What is the paramount lesson learned by the automotive industry in 1921? This question was put to its four hundred affiliated manufacturing concerns by the Motor & Accessory Manufacturers' Association and a summary of the replies has just been made public by M. L. Heminway, its general manager. The overwhelming majority of the responses indicate that the chief fundamental lesson learned by the automotive companies during 1921 was the necessity of maintaining conservative, balanced inventories.

Corrollaries of this, mentioned by most of the companies, are the danger of over-expansion and over-optimism; the menace of "over" overhead; the necessity for rigid but sound economies; and the elimination of "rainbow-chasing." General conservatism in buying, greater prudence in making commitments, and closer period buying are mentioned by virtually all the executives who contributed to the symposium as last year's principal contribution to business wisdom.

Another significant recurrent note in most of the statements is the lesson learned by manufacturers that the viewpoint of the ultimate consumer must to a greater extent guide production and distribution policies. The replies are replete with phrases such as these:

"Order more conservatively—respect contracts." "Quality workmanship at fair prices." "Keep your house in order." "Greater efficiency—lower price." "Study costs."

The experience of the automotive industry last year, in the opinion of a leading engine manufacturer whose statement is typical of the rest, will be "enormously beneficial in guiding the future policies of the industry. It has taught every one the need for closer period buying."

One of the largest axle manufacturers in the United States sums up the lessons of 1921 thus:

"The paramount thing taught by last year's experience is that the saturation point has been switched from manufacturers' production to used machines, and that, until those now in the hands of the dealers can be disposed of, there should be a decided contraction in the new product."

Throughout the statements there is manifest a candid attitude which lends additional value to the analysis of conditions thus presented. There is a readiness to admit past errors of judgment and blunders of commission and omission, and a firm, vigorous readiness to correct these mistakes constructively by facing the 1922 problems aggressively but sanely. This is expressed as follows by a representative unit manufacturer: "We must pay attention to fundamental principles in manufacture and in business. Our inventories must be kept within reasonable bounds; we should not sign contracts more or less blindly and, in short, we should conform to the laws of sane business, which, for some reason or other, we seemed to have forgotten during the preceding few years. We have learned, also, of the evils of 'over' overhead; we have learned how to economize in our shops; we are thrifty, whereas always in the past we have been reckless; and we are thinking more of what the public or our customers want, rather than what we feel they should use."

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lation, backed by the steam roads and the electric lines. This law is now on our statute books and, if enforced, will rule the following trucks off the highways." The bulletin then proceeds to list all the trucks of standard make which, according to the authority cited, are designed to carry more than 70 per cent. of their weight and load on the rear axle.

The substitute Burke bill was passed without a public hearing and it is now understood to be the purpose of the association to carry the matter to the Supreme Court of the state.

Buda Service Stations Incorporated

The Automotive Parts Corporation of America, which has already established 29 service stations to handle Buda products, has been incorporated in Chicago by the officers of the Buda Company, and the number of main stations ultimately will be increased to about 50. The main stations will be supplemented by a series of sub-stations which will carry only the fast moving parts and will depend upon the main stations for the larger and more expensive parts. By means of these stations the Buda Company expects eventually to cover the whole country so that any part for a Buda engine can be obtained within a few hours. All stations will maintain a uniform list price.

Most of the Buda service stations now are carrying Torbensen axles and Fuller transmissions. These parts are handled under the same sales policy as that outlined by the Buda company. Negotiations now are under way for servicing several other major units through this service station system. It is proposed to adjust repair part prices from time to time so that the units will be sold to the consuming public at only a fair margin of manufacturing profit.

New Autocar Prices

The Autocar Company of Ardmore, Pennsylvania, has announced a new schedule of prices effective January 3 for its standard 2-ton Autocar and for its 5-ton heavy-duty model. It announces also a new model heavy-duty 2-ton Autocar.

The price of the standard 2-ton machine, with its overall capacity of 11,000 pounds, will be reduced from $2,300 and $2,400 to $1,950 for the 97-inch wheel-base and to $2,050 for the 120-inch wheel-base.

The new 2-ton heavy-duty chassis, with a 4-cylinder motor and an overall capacity of 14,000 pounds, will be priced at $2,950 for the 114-inch wheel-base and $3,075 for the 138-inch wheel-base.

The 5-ton heavy-duty chassis, with its overall capacity of 22,000 pounds, will be priced at $3,950 for the 120-inch wheel-base and $4,100 for the 156-inch wheel-base.

Receipts from U. S. Truck Taxes Total $11,640,035

PASSENGER-CARS PRODUCE $64,388,184

Detailed figures of the origin and amount of taxes collected by the Bureau of Internal Revenue throw interesting lights on the industrial situation in the United States. For example, a tax of 3 per cent. is collected monthly from manufacturers of motor trucks and the accessories that go with the outfit; a tax of 5 per cent. is collected from manufacturers of cars fully equipped; and a tax of 5 per cent is collected on all accessories sold separately to anyone other than the manufacturer.

The report of the Commissioner of Internal Revenue for the fiscal year ended June 30, 1921, shows that, in the entire United States, taxes of $11,640,035 were collected from manufacturers of motor trucks, $64,388,184 from manufacturers of cars, and $39,378,184 from manufacturers of accessories sold separately. This total tax of $115,546,248 therefore represents a total manufactured output of $2,466,125,726—$388,001,866 for trucks, $1,287,763,680 for cars, and $790,360,180 for separate accessories.

Analyzing the specific figures for each state in the same manner, Michigan manufacturers sold between July 1, 1920, and June 30, 1921, a product valued at $1,135,752,787, or approximately 46 per cent. of the country's total expenditure for motor vehicles in the twelve-month period. The tax was $54,095,762, or about 47 per cent. of the total tax paid by users. The discrepancy in percentage is accounted for by the fact that Michigan's predominance is greatest in passenger-cars, on which the tax is 5 per cent., while other states press her more closely in trucks, on which the tax is only 3 per cent.

While Michigan manufactures about two-thirds of the automobiles, and Indiana, the second largest producer, about one-tenth, New York makes considerably more than one-half as many trucks as Michigan. Ohio, with her rubber industries, is way to the front with accessories, with Michigan second and New York third. California, with only a small car output, produces over $20,000,000 in value in accessories.

Without reducing the tax collections to output valuations, the relative manufacturing position of the leading states is shown by the following record of tax payments made:

State.	Trucks. 3%	Cars. 5%	Accessories 5%
Michigan	$ 4,037,816	$42,372,969	$ 7,684,977
New York	2,476,820	4,869,038	5,473,122
Indiana	629,527	6,320,072	1,684,777
Ohio	1,460,038	5,349,799	12,810,407
Illinois	625,787	1,735,960	1,993,716
Pennsylvania	487,580	412,346	2,055,757
Total U. S.	$11,640,055	$64,388,184	$39,518,009

Trucks in Chicago

An official count of the motor trucks and light delivery cars in use in Chicago on December 20 shows 18,429 motor wagons rated at 1-ton or less and 10,810 rated at more than 1-ton, a total of 29,239 commercial motor vehicles of all kinds, exclusive of taxicabs and similar conveyances.

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Light on the Second-Hand Problem

Survey of Conditions Surrounding the Acceptance and Sale of Used Trucks Shows Prevalence of Excessive Allowances and Urgent Need for a Solution

ALTHOUGH the problem of second-hand trucks has always been one of importance, the months of business depression through which we have been passing have emphasized the gravity of a situation that increases in magnitude from year to year as the discarded vehicles of a continuously growing annual production are thrown upon the market in competition with new product. The situation has been rendered even more acute during the last year and a half by the enormous amount of surplus motor truck equipment owned by large truck operators, which has, through the decline in general business, been standing idle and which they, under the pressure of business necessity, have often sought to convert into cash by quick sale at very low prices. The reimportation of abandoned army trucks through an English trading company, while not attended with the degree of success anticipated by its inaugurators, has contributed sourness to a condition already harrassing, and the distribution by the federal government of surplus army trucks among the state highway departments has prevented the sale of many new machines.

Since the demand for new trucks has, through the general retardation of business, been greatly reduced, many dealers have resorted to novel and unsound practices in an effort to move new product from the floor, and the plan of making absurdly liberal allowances for old machines taken in trade on the sale of new ones has often seemed the easiest way out of the dilemma. These used vehicles have been sold to second-hand dealers for amounts almost always less than the sums allowed for them in trade, so that the net result has been dissatisfaction and usually loss to the established truck dealer. The practice of taking old machines in trade in the expectation of moving them on a profitable or at least a "break-even" basis to others who specialize in their sale has been a feature of the retail truck and car business and may continue to be for many years, but the growth of competition, coupled with the difficulties of the period from which the industry is emerging, has favored the adoption of dangerous and destructive methods, among which excessive allowances for traded-in equipment is one of the most menacing.

A survey of present conditions in the field of second-hand truck buying and selling discloses some interesting facts regarding the part played by the dealer and by the manufacturer, of whom the latter must share in the responsibility although not, perhaps, to the same degree as the former. The part played by the vehicle makers in bringing about the present situation, which is now unusually grave because of the problems of the readjustment period, is shown by the financial requirements of the manufacturers, the need for keeping dealers supplied with new machines at marketable prices, and the special trade allowances which some manufacturers have given to dealers. On the other hand, there is wide recognition of the shortcomings of some dealers, and the unscientific way in which they have cared for their side of the problem.

It has been estimated that dealers and branches during the past twelve months have sold $200,000,000 worth of trucks and used cars at little or no profit. It is felt that something is radically wrong when that amount of retail business in America is done at a loss. In most cases new vehicle dealers have suffered this loss.

Requiring dealers sometimes to take their full allotment, overproduction of certain machines, rushing production to use up old inventories and giving inside trade allowances are among the things attributed to the manufacturer in developing the present situation. Interviews with dealers prove that handling used machines could be made a profitable business provided they would, through their salesmen, educate their customers to the true value of second-hand vehicles. Substantial dealers insist that there will be little difficulty if all dealers taking in used machines would learn not to accept them in trade, but to buy them for resale at a profit. They should, it is felt, make a virtue out of a necessity and buy second-hand vehicles with enthusiasm and with knowledge that when bought right they can be sold at a profit.

While much of the information relating to this problem applies to the passenger-car side of the business, it is even more applicable to motor trucks, although not a few students of the industry feel that second-hand trucks should never be bought by the dealer in new trucks, but that as long as the truck gives service it should be retained by the owner. Of the plans offered for the solution or amelioration of the second-hand problem many are excellent in theory but are not workable, either because of the question of legality or the well-known failings of human nature. There stand out, however, two very definite proposals which, if adopted promptly, dealers declare would better the situation. (1) Each manufacturer in advertising his new machines, shall also advertise the market price of his older models; (2) dealers in each locality shall authorize one or more independent and impartial appraisers (similar to real estate appraisers) who, for a fee, paid by the dealer or car owner, shall give the sales value of any machine submitted by a dealer or a customer.

Under the first plan the manufacturer would advertise the sales price of his old models in good condition, based on reports from around the country. This is a development of the used-car market report similar to the Chicago plan, but would be more official and more widely distributed. It should not be necessary to give sales values on machines less than a year and a half nor more than four years old. The plan would give some protection to the new truck dealer, because a customer could hardly ask for a greater allowance than he knew his used machine could be sold for. This plan, it is felt, would increase the respect for the second-hand vehicle, because the manufacturer would be giving true, accurate information on values. It would also encourage buyers to enter the market for used machines.

Under the second plan the dealers in each locality would authorize a sufficient number of appraisers to appraise second-hand machines offered in trade. The appraiser would have proper quarters with experts to drive the vehicles, judge the condition of the parts and tires and be prepared to issue a certificate to the owner, giving the value of the machine, which certificate would be recognized by any dealer. The dealer or the owner would pay a fee of $2 or $3 to the appraiser, who would be entirely independent of any particular dealer. He would be appointed for his ability, just as a real estate appraiser is recognized by real estate firms. Such a plan would give dealers a true knowledge of the value of the machine they are about to buy. There would be nothing to prevent any dealer from allowing a sum in excess of the appraised valuation, but when so doing he would be inviting a loss with his eyes open. Customers, as a rule, are fair, and expect a dealer to make a fair profit. Unfortunately, owners of used trucks over-estimate their value and, with no official appraisement in opposition, are generally good enough salesmen to sell the dealer a machine for more than it is worth.

Some manufacturers and some dealers declare there is little that can be done which will bring any improvement. The majority including some leading makers, are not willing to admit that the situation is hopeless, but are convinced that this industry is big enough, and that manufacturers and dealers have the brains and vision to develop some plan that will make for greater stability for this weak department of the business and still be fair to the buyers of trucks. It offers a challenge to the industry's leaders that can not be ignored.

Plans of the typewriter, cash register and other industries have been considered, but it is agreed that the truck situation is hardly comparable, although there is much that can be learned from those old industries that have dealt with the trading-in problem. Prominent among suggested remedies are the following:

1. Make better machines and fewer.
2. Get suggestions of what to do from

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each manufacturer and conduct a joint campaign.

3. Treat the used truck customer with the same respect as the new truck buyer.

4. Give service at a fair price.

5. Give a larger dealer discount.

6. Start a campaign to show that mere transfer of ownership does not mean depreciated value.

7. Recondition the vehicle before selling.

8. Establish local coöperative repair shops where machines of various makes can be reconditioned at cost.

9. Put major selling efforts into selling reconditioned vehicles.

10. Guarantee satisfaction or money back.

11. Be especially careful of allowances made to business houses as this becomes a permanent record.

12. Cover used truck question in dealer contract, requiring reports on potentiality of territory so that he will not get overstocked.

13. Have sound book-keeping and financial practices with regard to used machines so as to have credit standing.

14. Try to concentrate as far as possible in trading in one's own make of truck.

15. Treat local used truck dealers fairly. Let them have parts at factory price so that the used vehicle can be sold economically.

16. Dealers must have a separate used truck department.

17. High-grade men should be placed on used truck sales.

18. Dealers should insist on giving demonstration of new truck before bargaining on old.

19. Do not give discount for quantity.

20. Give reconditioned trucks same guaranty as new.

21. Make each salesman sell every truck he takes in unless it is obsolete.

22. Just as many salesmen and just as good salesmen should be selling second-hand trucks as new ones.

Reports from big centers have tried to show heavy losses sustained by dealers on used trucks, whereas losses charged against second-hand vehicles were really losses on new machines because of the over-allowance on used ones. Just how many second-hand machines are for sale in the country is not known and would be difficult to ascertain.

The situation may be analyzed somewhat as follows:

Source of Actual Supply of Used Trucks:

Used truck dealers.
New truck dealers.
Garages, service stations, etc.
Financing companies.
Insurance companies.
Owners offering their trucks for sale.
Thieves.

Government agencies having confiscated vehicles for sale.

Source of Potential Supply of Used Trucks:

Owners contemplating "tarde-ins" for new trucks.

Owners contemplating the abandonment of truck use for financial or other reasons.

The Total Used Truck Supply:

The foregoing analysis makes it apparent that, with the exception of

Trucks which owners have no intention of selling and trucks which are unsalable, everyone of the trucks used in this country is always likely to get on the market in competition with the sale of new machines.

The Demand for Used Trucks:

Persons not now owning trucks who are in the market for trucks, but:

Prefer used trucks of better to new trucks of poorer grades, or

Are financially unable to buy new trucks.

Persons now owning trucks who:

Desire to sell them and buy better used trucks.

Trade them in for better used trucks.

Insurance cheats.

Wrecking establishments.

The Demand for New Trucks:

The foregoing makes it clear that the market for new trucks is the difference between the total demand for motor transport and that portion of the demand which can and will be taken care of by used trucks. What these elements amount to in actual figures, types of vehicles, etc., of course, is a matter of conjecture.

Stimulating the Sale of New Trucks:

By widening the demand for motor transport it is certain that the portion of it which can not be cared for by used trucks must be cared for by the increased production and sale of new trucks, or

By reducing the number of used trucks, thus limiting the power of used machines to supply the demand for motor transport.

Reducing the Number of Used Trucks:

True valuations for "trade-ins."

Campaign urging owners to scrap machines when maintenance and operation costs become excessive and outweigh economies and advantages to be derived from purchase of new trucks.

A variety of remedies has been proposed, some of which may be too difficult to put into practice, others might technically violate laws against restraint of trade, and still others would be only preventive of aggravating the situation and not corrective of it as it exists. All are offered for what they are worth and are given without names or locations of those who suggested them:

A. Used Truck Market Reports.

Dealers allowing the quoted market prices for used trucks taken in trade.

B. Official Appraiser.

Independent and impartial appraisal bureaus to be established in larger cities. Dealers accept trucks in trade at prices set by bureau. Each dealer to sell used trucks he takes in trade.

C. Official Appraisers Paid a Fee by Owners or Dealers.

Similar to above plan, but supported by fees paid by owner or dealer for each appraisal.

D. Manufacturers Quoting Prices of Second-Hand Product.

Maker sets new truck price. Might also set second-hand value in good condition for given year. Dealer taking truck in trade, deducts from this figure his profit, cost of handling, and cost of reconditioning to determine allowance.

E. Dealers Publish Prices of Used Trucks Sold.

Dealers in each locality to conduct information bureau to make public the sale prices of the various makes of used trucks sold by dealers during the previous two weeks. This is similar to the Chicago used car market report which is available to dealers everywhere.

F. Used Truck Exchanges Maintained by Dealers.

To be used truck department, sales force and appraiser for all dealers. To buy used trucks from dealers, recondition and sell them.

G. National Used Truck Markets.

For the benefit of intending purchasers of used trucks, and in order that the greatest possible line of used trucks may be available to such intending purchasers, and that owners of used trucks may always find a ready market, it has been suggested by some that such markets be provided nationally, so that every community may have them at hand, and so that the owners of used trucks, who wish to avail themselves of such exchange, may be able to make the genuine value of such trucks immediately available, and to the same ends that such market issue on the doposit of such a truck, a negotiable receipt or certificate which may be used by the depositor of the truck, either as collateral upon which to borrow money for the purchase of a new truck or to be given in part payment for such new truck. These used-truck markets may be incorporated with a wide distribution of the stock.

H. Factory Rebuilding.

Trucks not too distant from factory to be returned for rebuilding. Practice successful in typewriter industry. One truck maker does it. Raises reputation of second-hand product and saves laying off help because of curtailed new production.

I. Advertising Economy of Obsoleting Old Trucks.

Some are using advertising to show advantage of disposing of old trucks, because too expensive to maintain, and getting new one.

J. Used Truck Shows.

To raise public esteem of second-hand trucks and show the thrift of a used truck purchase.

The National Automobile Chamber of Commerce, which has been actively working toward a solution of the second-hand problem, says:

"Stop making over-allowances. Honestly recondition trucks to give good service at prices charged. Display and advertise them as well, and sell them at fixed prices with as good salesmen, and as much concern for customer satisfaction as though they were new, guaranteeing them for a period like a new truck and taking same responsibility for their performance. Sell used trucks on hand at prices corresponding with prevailing new truck prices. Handle used truck business in a separate department from the new. The biggest step toward the solution of the problem is that the dealer taking in second-hand trucks will learn to 'buy them right.'"

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Motor Truck Maintenance on a Contract Basis

By H. T. C.

BY way of preface to what I have to say hereafter, it should be explained that we operate a complete service station and garage in one of the larger cities of the Middle West and that we have adopted the policy which aims to give special attention to the needs of the motor truck operator, whether his investment be represented by a single vehicle or by a fleet. Our plan is to offer a truck owner a contract covering the maintenance of his vehicles in efficient and economical working order for a stated consideration.

This method of doing business is, as we understand it, something in the nature of an innovation, as far as general use by the trade at large is concerned, and certainly it is not very old with us, as it is now less than a year since the plan was inaugurated in our establishment. So far the results have been all that could be expected, and our customers are unanimous in their expressions of satisfaction and appreciation. We have, of course, encountered some difficulties, chiefly matters of administration and rate-making, but we have overcome the great bulk of our troubles and the business moves along smoothly, in spite of the fact that the number of machines entrusted to our care is growing almost weekly and the effect on our costs, especially as regards overhead charges, is constantly shifting.

The policy as adopted by us is founded on the belief that the only satisfactory way for a truck operator, whether he owns one or several vehicles, to secure maximum results is to contract for their up-keep and thus relieve himself of the worry and responsibility, at the same time knowing to a penny what their repairs are costing him. In soliciting new business we make use of the following form letter, which has developed considerable interest but not as much business as might be expected from the general attractiveness of the proposal:

Gentlemen:

Regardless of the length of your experience with motor haulage, you have certainly learned the importance of careful maintenance of your equipment for the dual purpose of protecting and conserving your investment and of keeping the equipment it represents in the best condition for efficient and economical service. You will, therefore, we believe, be interested in the following proposal:

We are prepared to make, now or at your convenience, free of charge and without any obligation on your part, a thorough, expert examination of your truck [or trucks] and to give you a detailed report, showing which parts require, or are likely to require in the near future, adjustment or repair. With the report we shall also submit an estimate of the price at which we are prepared to carry out such work. Afterwards we shall make a periodical—generally monthly—examination and report for the nominal fee of $5.00 per vehicle per examination, with an estimate of the nature and cost of repairs, should any be necessary. In this way you will always have your vehicle [or vehicles] under the eye of a practical expert, you will be forestalling break-downs, and will always have it [or them] at work and in good condition.

Many of our clients find that our periodical examination proves also a useful check on their drivers and prevents them from misusing their vehicles or shirking the greasing and small adjustments a driver is supposed to look after. In other cases we have been able to effect a considerable economy in fuel and oil consumption. You must know of cases yourself where the expenditure of a dollar or two in timely adjustment or repair would have saved a $50 repair and the disorganization caused by your vehicle being out of service.

We have well-equipped machine-shops and we ourselves undertake all repairs; there is no waiting. Should your vehicle [or vehicles] be garaged with us, we should make no charge for the periodical examination.

Our representative will be delighted to have the opportunity of calling and explaining the system to you in every detail, if you will but express your desire. If you need our service quickly, please telephone North 4000.

Once negotiations are opened up, we suggest the annual basis of truck maintenance and submit the following proposal:

Gentlemen:

Having now examined your vehicles, we are pleased to make you the following tender:

We are prepared to undertake the maintenance in good order and appearance of the chassis and bodies of your motor trucks for one year from the date of your accepting this proposal for the following amounts:

For the ....-ton .... truck, $.... per annum.
For the ....-ton .... truck, $.... per annum.
For the ....-ton .... truck, $.... per annum.

These charges to cover: (1) All repairs to chassis and body, and the replacing of any parts broken or worn past adjusting, which spare parts to be obtained from the makers and charged extra at makers' list prices, and one complete overhaul during the year, in which the body is to be repainted and the chassis completely stripped and all parts (engine, steering-gear, rear axle, transmission, etc.) dismantled for examination and reconditioning. (2) Going to break-downs and towing home, if necessary, from anywhere in the city. Further afield extra, according to distance. (3) A weekly examination of each vehicle for minor adjustments and repairs. You to allow us reasonable access to the vehicles to make this periodical examination, and time to make any adjustments and repairs, when we consider them to be necessary.

These charges do not cover cleaning, oiling and greasing, nor the supply of oil and fuel, the repair of damage caused by overloading or by gross negligence on the part of your drivers or employees, or damage through lack of lubricant or use of unsuitable oils or greases; or through your driver's failure to report any small derangement which has led to extensive break-down, nor to include any accidental damage which we understand is covered by insurance; nor the repair or replacement of tires. New tires to be supplied when necessary at makers' list price and fitted free of charge.

In case of any dispute as to the work or in the reading of this agreement, the Motor Trade Association to be asked to appoint an arbitrator whose decision shall be binding and whose fees shall be paid by the side against which the decision is given.

Payment to be made monthly in twelve equal sums at the end of each completed month.

It will be understood, of course, that the prices we quote vary with the kind of truck, its age, condition, the nature of its work, the size of its loads, etc. Experience has taught us many things about the importance of these and other factors and has furnished criteria by which we are able to give attractive and safe estimates of maintenance cost.

Over 100,000 Trucks in New England

Careful estimates indicate that there are more than 107,700 motor trucks registered in the New England States. This represents an increase of more than 11,000, or 11.4 per cent over the number in use at the end of 1920. The increase in trucks throws an interesting sidelight on the competition to which New England railroads are being subjected, and which some steps have been taken to meet to a certain degree. The use of trucks in New England gained remarkable headway during the war when the railroads were congested with movement of war materials and otherwise disorganized. Maine shows the largest percentage of gain in truck registration. It is estimated that there are 9,900 trucks in use in that state compared with 7,512 at the end of 1920, an increase of 2,388, or 31.8 per cent. The great industrial states of Massachusetts and Connecticut, of course, have a larger number of trucks in use than any of the other New England states and this is where the railroads have felt competition to greatest extent.

The following shows the estimated truck and passenger car registration in the New England states at the end of 1921 in comparison with actual 1920 figures:

State.	1921.	1920.	Percentage Increase.
Connecticut:			
Trucks	23,662	22,500	5.1
Cars	106,575	94,484	12.8
Maine:			
Trucks	9,900	7,512	31.8
Cars	68,100	55,395	22.9
Massachusetts:			
Trucks	*55,261	50,624	9.1
Cars	*305,571	254,007	20.3
New Hampshire:			
Trucks	5,440	4,447	22.3
Cars	37,060	30,233	22.2
Rhode Island:			
Trucks	10,000	8,747	14.3
Cars	43,000	37,587	11.7
Vermont:			
Trucks	3,500	2,916	20.0
Cars	37,500	28,709	30.6
Totals:			
Trucks	107,763	96,746	11.4
Cars	597,806	500,415	19.5

*Actual registration on November 30.

New York Buys 87 Trucks

The City of New York has awarded to the Pierce-Arrow Motor Car Company a contract for 87 heavy-duty motor trucks with a total value of $350,000. The order will place the production capacity of the company's truck department at about 100 per cent. At present it is running a little above 90 per cent. The trucks are to be used by the department of streets, some of them in the city's snow fleet.

City 'Buses for New York

Mayor Hylan of New York, has announced that the administration has completed its plans to establish a new 'bus line on Fifth Avenue and Riverside Drive, which will charge a 5-cent fare and operate in opposition to the Fifth Avenue Coach Company, which charges a 10-cent fare.

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Electric Trucks in Big Cities

Some interesting statistics regarding the number of electric trucks in use in the country have recently been compiled. They show the following figures for some of the larger cities:

City.	Electric Trucks.	Percentage of Total in U. S.
New York	3,541	35.85
Chicago	1,450	14.68
Philadelphia	575	5.81
Boston	335	3.39
Detroit	278	2.82
Baltimore	257	2.60
Washington	244	2.47
Cleveland	222	2.25
San Francisco	170	1.73
Pittsburgh	125	1.27
Kansas City	113	1.14
Buffalo	100	1.01
St. Louis	86	.87
Rochester	82	.84
Seattle	78	.80
Milwaukee	50	.50
Denver	40	.41
Cincinnati	27	.28
Minneapolis	21	.22
St. Paul	10	.10
Total for 20 cities....	7,814	79.04

Out of a total of 9,872 electric trucks in the entire country, 7,814, or more than 79 per cent., are in the 20 cities named, leaving roughly 1,000 machines scattered throughout the balance of the United States. These figures are based on actual surveys, except in a few cases, and are correct as of September 1, 1921.

The New York Edison Company is authority for the statement that 129 electric trucks were sold to 40 buyers in Manhattan and the Bronx during 1919. Of that number, 116 machines were sold on repeat orders to 29 buyers. In 1920 there were 536 trucks sold to 119 buyers, and of that number 461 were on repeat orders from 52 buyers.

In the two years between 1917 and 1919 the number of electric trucks in Manhattan and the Bronx, New York City, increased more than 15 per cent., while the number of horses decreased about 28 per cent.

Truck Classification Changed

Changes in the classification of trucks with reference to chassis weights, fees, and maximum over-all weights allowed, as made by the Pennsylvania highway authorities, are presented in the following table:

Class.	Chassis Weight Lb.	Tire Fee—Pneu.	Tire Fee—Solid.	Max. Cap.
AA	2,000-2,999	$ 24	$ 30	7,000
A	3,000-3,999	32	40	11,000
B	4,000-4,999	40	50	13,000
C	5,000-5,999	56	70	18,000
D	6,000-7,499	80	100	22,000
E	7,500-8,499	100	125	25,000
F	8,500 and over	140	200	26,000

Trucks having chassis weight of less than 2,000 pounds are registered on the basis of a horse-power rating, with a minimum fee of $15. A truck-tractor with a semi-trailer attachment is registered as one vehicle, with the fee computed according to the table of weight and the fees specified for trucks and upon the basis of the chassis weight of the tractor, plus the weight of the attachment. The fee for registration of any trailer with metal tires is double the regular fee for trailers.

The principal demand in Siam is for light delivery trucks in Bangkok, for 2½- to 3-ton trucks to be used as 'buses in the north of Siam, and 3-, 4-, and 5-ton trucks for use in timber and mining operations.

5-Ton Truck Earns First Cost in Year of Brick Hauling

By ROY B. HOWARD

Manager, Brick Cartage Company, Chicago

OUR 5-ton truck is delivering an average of 10,000 brick a day during the busy season. We have about 8 months steady work for our truck, and the remaining 4 months it works about half time.

We specialize in hauling facing brick, which is expensive, averaging $40.00 per 1,000. Such brick requires careful handling, especially in loading and unloading, to keep the corners and edges from breaking off. We are handling this brick regularly for four companies and occasionally haul for other companies.

When there is no brick to be hauled we pick up odd jobs, but hauling brick is by far the biggest part of our work. We run as far as Wilmette, 18 miles north, and south to Chicago Heights, 23 miles, and Porter, Indiana, which is about 60 miles distant.

The usual load is 2,000 bricks, or approximately 6½ tons. This is an overload, as the truck is only a 5-tonner, and the brick is a dead weight with very little resiliency. However, the truck is running on good pavements practically all the time, and we have noticed no ill effects from this overload.

The truck has proved very satisfactory in our work. Actual repairs have been extremely low—only $46 during 15 months of operation—and this was for grinding valves and removing carbon. We have a very good driver, who takes excellent care of the truck and does not abuse it. The truck carries a helper also, because the brick can not be dumped or thrown off, but must be carefully loaded and unloaded by hand.

During the 15 months ended June 16, 1921, this truck traveled over 15,000 miles, or an average of 47 miles daily. The actual repairs for this period were only $46, but we are allowing $300 to take care of an overhaul. Driver and helper cost $11 a day, and 43.82 cents per mile. As we ordinarily haul 10,000 brick daily, the cost per 1,000 is $1.21 or 44 cents per 1,000-brick-mile.

The average costs over the 15 month period were:

Fixed charges	$ 849.90
Variable charges	2,443.36
Driver's and helper's wages	3,575.00
Total—325 days	$6,868.26
Average per day	21.13

We often deliver to Wilmette, Evanston, and many other suburbs of Chicago. The distance to Wilmette is 18 miles, and the hauling cost is:

Variable expense (36 miles at 15.9 cents)	$ 5.72
Fixed expense (½ day at $2.61)	1.31
Driver's and helper's wages (½ day at $11)	5.50
Total expense of trip	$12.53

Hauling 2,000 brick, the cost is $6.27 per 1,000, and 34.2 cents per 1,000-brick-mile. We always endeavor to carry a full load every trip, as it costs no more to haul 2,000 brick than it does 1,000.

One trip was made to Porter, Indiana, a distance of approximately 60 miles, during a railroad strike. The cost of operation was:

Variable expense (120 miles at 15.9 cents)	$19.08
Fixed expense (1 day)	2.61
Driver's and helper's wages (1 day)	11.00
Total expense of trip	$32.69

Hauling 2,000 brick for this distance, the cost is $16.35 per 1,000, and 27 cents per 1,000-brick-mile.

We get roughly $2.70 per 1,000 for the first 1½ miles as the crow flies, and 70 cents per mile after that. During the busy season the truck earns from $20 to $50 daily, which gives us a good profit. It paid for itself during the first 12 months.

We are very pleased with the machine—a Selden—as it has given us exceptionally good service, and looks as though it would last a long time. We are operating 2 teams, but the only place they are efficient is in hauling around the brick yard and to nearby freight depots.

Will Aid Railways Against Trucks

The Michigan Public Utilities Commission through its chairman, Sherman T. Handy, has outlined its policy toward controlling motor truck lines. The commission will endeavor to prevent dissipation of utility property by unfair and unnecessary competition.

"When the legislature seeks the coöperation of this commission in drafting legislation for the regulation of motor truck transportation, we will recommend such legislation as will protect the pioneer, stable and serviceable interests then engaged in it from unfair and unnecessary competition to the end that a fair return may be received on the investment and a fair grade of service rendered to the public," said Mr. Handy.

Mr. Handy believes manufacturers operating their own truck lines could not be designated as common carriers. Authorization of motor truck lines parallel to existing serviceable transportation routes is regarded as unlikely. "Loss to the public inevitably follows unreasonable and unnecessary utility competition," says Mr Handy.

French Automotive Production

It is estimated that during 1921 France produced 53,000 passenger-cars and 2,500 trucks. Citroen is the leading quantity producer, with 15,000 cars during 1921, which is possibly less than half the capacity. Fifty-five thousand people are engaged in the manufacture of chassis and parts, 15,000 on body work, and 10,000 on accessories, making a total of 80,000 people on the payroll of automotive manufacturers.

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Fighting Solid Rock with Trucks

How the Niagara Falls Power Company Is Utilizing Motor Trucks in Excavating Nearly 750,000 Yards of Rock to Complete Its $8,500,000 Power Extension Plan

IF you had to haul 60,000 solid yards of limestone out of an 80-foot pit, climbing a short ramp of a 20 per cent. grade and a 300-foot incline of from 10 to 12 per cent. grade, what would you use, horses or trucks? If the haul were only 2 miles, the latter part of it over a dumping ground hummocked with rough chuck holes, would you attempt to use trucks? Ten years ago, yes, five years ago you would have said "horses" instantly. If you had even suggested motor trucks your sanity would have been questioned.

But much has happened in five years. Trucks are more powerful than ever before; they climb far steeper grades; they withstand much more abuse; better spring suspension cushions their loads. And so, when the Read-Coddington Engineering Company, engaged by the Niagara Falls Power Company, of Niagara Falls, New York, to develop an $8,500,000 power extension plan, was faced last spring with a problem substantially as above, it decided on trucks.

The power company project calls for the excavating of a 4,300-foot tunnel or underground aqueduct to convey water from Niagara River above the falls to the company's power-house. A fan-shaped inlet in the river, sloping to a depth of 70 feet, is at one end, and a rectangular outlet or forebay, 80 feet deep, is at the other end of the tunnel. Trisecting the tunnel are two shafts, 10 feet wire, 30 feet long and 145 feet deep. These units—the inlet, the outlet, and the tunnel—are being blasted out of solid limestone. When the work is completed, nearly 750,000 cubic yards of loose material will have been removed. The flow of water thus created will be utilized in generating about 200,000 electrical horse-power, an addition to the 265,000 horse-power now developed at the hydraulic plant of the company.

Before selecting equipment for the excavation and haulage work the contractors were in possession of a complete knowledge of the geological conditions. They knew the nature of the rock formation beneath the city of Niagara Falls and were well aware that the job would be the severest possible test of tools and equipment. When the decision was made to use trucks, it was realized that their task would be formidable, for the rapid handling of broken rock is at best a rough job.

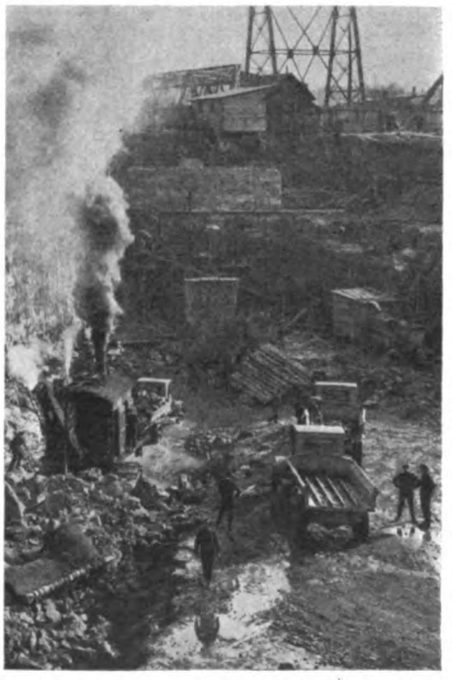
"We can use trucks if we can find trucks which have power and speed and at the same time won't break up under the battering they will get," said one of the contracting officials. "We can't afford breakdowns, because truck failure would slow up the whole operation. If the trucks can't keep our shovels and our drills busy, we don't want them."

Accordingly, a demonstration, in which several of the better makes of trucks participated, was held early in the spring of 1921. Pulling ability, speed, gasolene and oil consumption were factors on which comparisons were noted. Reliability could be judged, of course, only from records of past performance of the various makes of trucks. The make finally chosen was Pierce-Arrow. A fleet of fifteen 5-ton trucks, equipped with 4-yard dump bodies, was purchased. Later 5 additional units were added, making 20 in all.

The new horizontal type of power hoist was specified. The mounting of this type beneath the body gives more load room, for the body can be brought close to the cab.

Steel bodies are being used, and to brace them against the shock of loading, 35-pound steel rails—four in number, were laid lengthwise in the bed of the bodies. The steel rails likewise facilitate dumping, the load sliding off them easily.

Excavation was started April 25, 1921, on the outlet, where 60,000 solid cubic yards—equivalent to double that figure in terms of loose yardage—are being removed. At the end of six months about 45,000 yards had been excavated, so rapidly has the work progressed. In the meantime the two tunnel shafts and the inlet excavations were under way. An average of 10 trucks served the shovel and cranes at the outlet, the remainder of the fleet being used at the other points.



Loading operations at the outlet continue while blasting is in progress, protection being offered by heavy rope mats and blankets of logs.

The outlet excavation, where the ultimate depth of 80-feet is being attained rapidly, is roughly the shape of a parallelogram, whose sides vary from 170 feet to 240 feet in length. The task of blasting is a delicate one, for on one side run railroad tracks and on another is the present hydraulic canal. To shore up the 20 feet of top dirt upon which the railroad tracks rest, a concrete retaining wall, 8 feet thick at the bottom, was built. The problem then was to cut perpendicularly downward without shattering the wall. The method used was this: A cut 10 feet deep and wide enough to permit the operation of a steam shovel was blasted parallel to the retaining wall, but 30 or 40 feet distant from it. Along the edge of this parallel trough, on the side toward the retaining wall, a row of holes was drilled. Then a slice was blasted so that the force of the explosion exerted itself toward the cut, the debris falling into it. Each succeeding slice was blown with lighter charges of powder. When the edge of the retaining wall was approached, the drill holes were placed only 6 inches apart and a very light charge of power was used to split the rock without shaking the concrete too severely. The excavation equipment in the outlet comprises a 1-yard Marion shovel, a 7-ton locomotive crane, and between 20 and 30 air-drills. A 20-ton locomotive crane also is operated from the top of the concrete retaining wall on the railroad side of the pit.

The speed with which the rock is being removed varies as different strata are reached. At first the limestone was so solid that it broke into huge pieces, some of them too large for the shovel to handle effectively. These large boulders were dropped on to the trucks by cranes. As lower strata of rock were reached, the dynamite shattered the stone into smaller pieces which could be handled more readily by the shovel. The difference in the solidity of the formation may be judged from the fact that in some levels 1.9 pounds of dynamite were used per cubic yard, while in others, .6 pound was sufficient. Rope mats and logs are used to muffle the explosions.

It was soon found that, at the speed at which the trucks operated, the shovel could serve as many as 12 trucks, although at times only 10 were used. The haul is 2 miles. Each truck makes from 11 to 13 trips a day, so that, on an average, 135 or 140 loads are removed daily. About 2 solid yards are loaded each time.

The operation soon revealed several practical features which accelerated the truck work. For instance, tail-gates were dispensed with, for it was found that a full load could be carried by piling it at the for-

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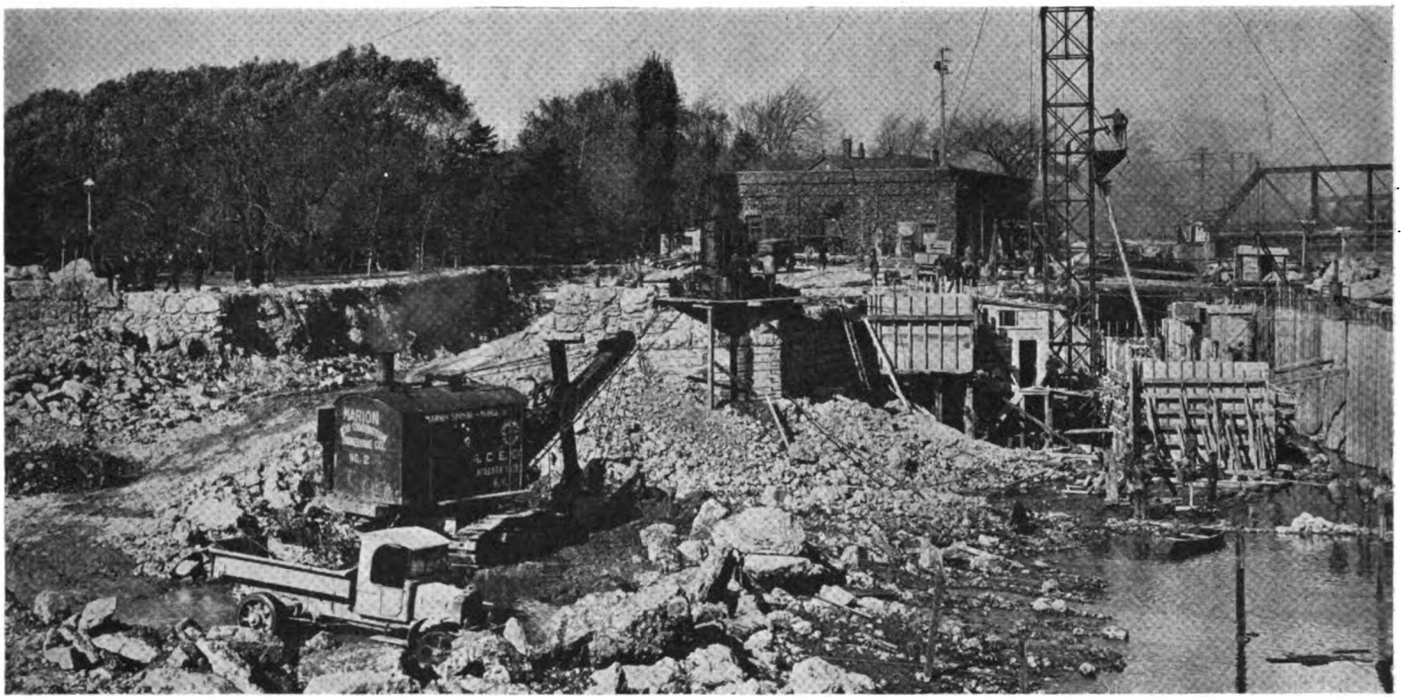


The inlet presents many difficult problems owing to the roughness of the ground and the water that stands in the bottom. The crank-case of the truck here being loaded is submerged.

ward end of the body. Thus no time is lost in fastening or unfastening the tail-gate locks. Moreover, the steam-shovel operator works with greater freedom, for there is no danger of damaging the tail-gates with the shovel.

One man is stationed at the top of the incline to "trim" the load before it starts on its journey. This is accomplished with a few strokes of a shovel, the trucks pausing only a few seconds. As a result of this "trimming", there has been no complaint of the scattering of loose parts of the load from the open end of the dump body. The "trimmer" also serves as a checker, moving pins in a board to show the number of loads hauled each day.

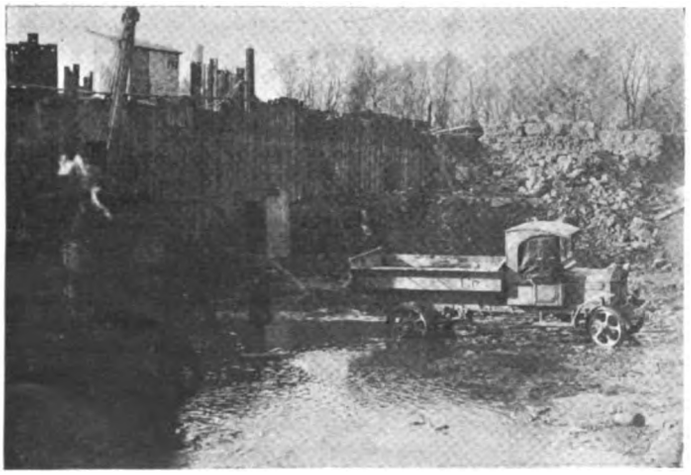
Another feature that has resulted in an economy of time and fuel is the method used in constructing the incline. To climb out of the pit the trucks ascend a short ramp which has a grade of 20 per cent. This is done, of course, in low gear. For a short distance the climb is one of 12 per cent., which levels out for 30 feet into a grade of only a few per cent. This gives the driver ample opportunity to shift from low to second gear preparatory to the final 250-foot climb of 10 per cent. gradient. In other words, a "gear-shifting level" enables the trucks to gain headway sufficient to make a faster ascent with a smaller expenditure of fuel. Thus, in spite of gear work on the incline and over the rough dumping ground, a fleet average of 4.5 miles per gallon of gasolene is maintained.

Although every effort is made to lighten the abuse to which the trucks are subjected, the contractors have found it impossible to avoid a certain amount of it. For instance, in loading a jagged boulder so big that it weighs well over 5 tons, the steam-shovel will drop it as gently as possible on the rear of the truck. And then, in order to place the load well forward on the truck the shovel will "bunt" it ahead. This operation shakes the truck as if it were a boy's cart.

Likewise they try to keep the surface of the pit as smooth as possible, but it frequently is bestrewn with rock and debris. It is not unusual for a truck to back over a rock the size of a barrel, dropping off it with a severe jar, or for a loaded truck to jounce over a heap of rough stones.

Breakage was expected, but at the end of 10,000 miles of operation, the contractors were surprised to find that the trucks had escaped the repair shops more than 90 per cent. of the time. In fact, most of what little repair was done was necessitated through accidental collisions. To keep the trucks in adjustment and to facilitate emergency repairs, a chief mechanic and assistants are employed. Close attention is given to lubrication, it being the sole duty of one man to grease and oil the chassis systematically.

Difficulties encountered by the trucks which are working on the inlet excavation equal those which have made the outlet so severe a testing ground. At the inlet the work is being done behind a coffer-dam



In spite of constant pumping the inlet is always flooded, but the presence of water has not affected the operation of the trucks.

The nature of the rock hauled from the inlet is well shown here, and the gradient which the truck is ascending is typical.

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This illustrates the method of placing the load well forward on the truck body, and shows one truck on the "gear-shifting" level.

During lunch hour the roadways are improved by the dumping of screenings. The special body floor rails are also shown.

which locks out the river. About 50,000 solid yards of limestone—100,000 cubic yards of loose material—are being removed. The inlet excavation slopes to a depth of 70 feet to the tunnel entrance. One of the chief obstacles on this section of the work is the presence of water. Five 10-inch centrifugal pumps draw large volumes of water from the big basin continually, but, despite this, the trucks frequently work in water that comes close to the hub caps.

An interesting feat of engineering is being undertaken to stop this flow of water which comes from a vein in the limestone formation. Three-inch pipes, 6 feet apart, are being thrust into this soft seam and cement will be forced into it under air pressure. The cement, it is expected, will clog up the water-bearing seam and stop the seepage. As it is, the excavation would fill with water within a few hours if the pumps were stopped.

Water also must be contended with at the outlet, but not to any such extent. One pump is sufficient to remove it, although an extra pump is held in readiness, for pump failure would mean an accumulation of several feet of water within a few hours.

A group of 4 or 5 trucks is employed on the shafts which will pierce the tunnel. These trucks are worked double shifts most of the time. From the two shafts about 3,000 cubic yards of solid material has been removed. The material is hoisted in a bucket which drops a full load into a truck.

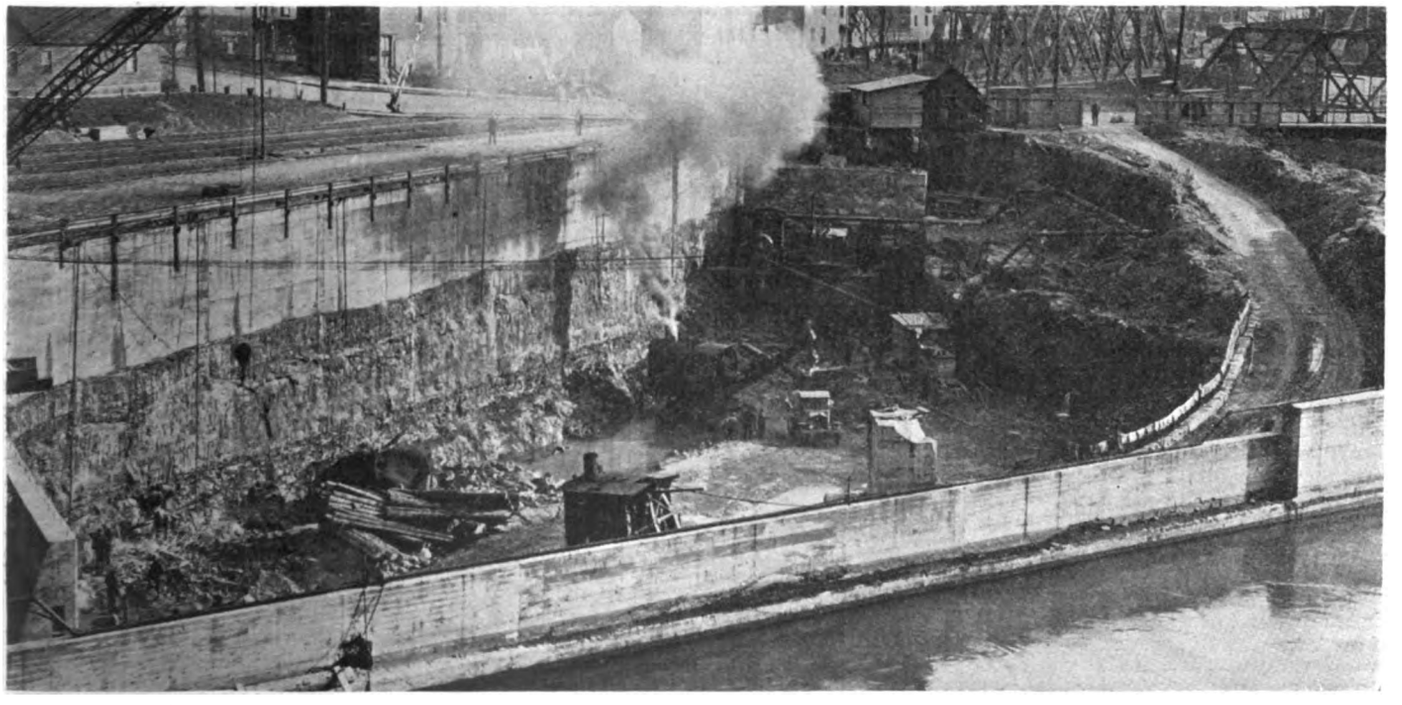
All the material from the tunnel likewise will be hoisted through the shafts, with the exception of that which is being blasted from the tunnel intake and outlet. The intake and outlet are bell-shaped, narrowing from a diameter of 50 feet to 36 feet, excavation measurements. The actual diameter of the tunnel when lined will be 32 feet. About 350,000 loose yards will be removed.

As an illustration of the efficient manner in which the entire project was planned, may be cited the fact that use is being made of all the material removed from the excavations. It is being dumped on the underwater lands of the company along the river front, and thus will reclaim a big acreage. It is on this dumping ground that the trucks undergo some of the roughest usage, for they travel over a hummocky surface which tosses the load continually.

Efficient operation has reduced the haulage cost per yard to a minimum. Because other phases of the excavation costs, such as drilling, blasting, steam-shoveling, etc., are involved, the exact truck figures are not available.

"Would you again specify the trucks if you had to do the job over again" Mr. Read was asked.

"The best answer to that question is the fact that we purchased 5 additional units after we had given trucks a 6-months' trial," was the reply.



This view of the outlet shows the steep incline and the "gear-shifting" level which the loaded trucks must climb on every trip. The blasting problem is also well illustrated in this picture.

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Sale of Trucks in Hongkong

A decided improvement in the market for American motor trucks became evident in Hongkong in the early part of November. Within a few weeks orders were placed in the United States for a total of 11 trucks. Previously the number of trucks in the Colony had never exceeded seven.

This increased use of trucks is due to better roads. The island of Hongkong is a precipitous mountain peak; all supplies and freight for the interior, therefore, have had to be carried up by coolies, in the absence of roads suitable for motor vehicles, except for a few streets near the waterfront and a road around the island.

The first motor road to the Peak is now in course of building, at considerable labor and expense. It has already been completed to the upper level and will soon be carried along the crest. Another road is being built across the hills to the other side of the island. These roads not only will open up many new building sites but will permit truck delivery of freight to portions of the island that are now inaccessible except by coolie carriers.

American motor vehicles of all types are well liked in Hongkong. In the case of trucks, it has been found that American machines are cheaper than other makes and at the same time are satisfactory. Furthermore, spare parts can be obtained much more quickly than in the case of trucks from other countries.

'Buses in Mason City

The Star Transportation Company of Mason City, Iowa, is operating three 1½-ton Denby 'buses with great success. Regular service is maintained between Garner and Charles City, Iowa, via Mason City, a distance of 52 miles, with a running time of 2 hours, 45 minutes, making 10 stops *en route*. Train connections are considered in the schedule, and reports show a very satisfactory service for patrons. Five operators are used, and definite instructions to insure safety for passengers are rigidly enforced.

The 'bus bodies used by the Star company were made by Miscampbell Company, of Duluth, Minnesota, and are very unique in construction and appearance. They are of rattan finish, with drop windows, and entrance at the right of the driver's seat controlled by him. They seat 20 people, and during rush hours are carrying as high as 30. Each 'bus carries advertising space for twenty cards, street-car style. Electric lights are furnished from ceiling dome lights. Special lockers carry tools and extra equipment, and a spare tire carrier is attached at the rear of the chassis. Thirty-five by five-inch front and 38 by 7-inch rear pneumatic tires are used, insuring extraordinary comfort to the passengers. Each 'bus operator has before him definite orders regarding his particular run, as to road conditions, rough spots, detours and speeds at which to operate at certain locations. He, likewise, has information to show him exactly where the other 'buses are at any time, in order to facilitate transfer and aid if needed.

The Shanghai-Taichong Long-distance Automobile Company will commence its service from Chapei to Lutien (China) in January.

"Direct to Consumer" Trade Rests on Trucks

By W. M. GENG
Tuckley-Newhall Co pany, New York

IN THE smaller towns and country districts within 200 miles of New York City, our motor trucks are as well known as the R. F. D. car. We handle all kinds of household furniture—pianos, beds, sideboards, lamps, tables, chairs, stools, kitchen utensils, etc.—and operate several branch stores in Greater New York. We originally purchased a motor truck to take care of our country deliveries, and with the help of our machines have been able to build up a big business selling direct to patrons living outside the city. The first truck—a Garford—was bought five years ago. Since then we have been buying additional trucks and turning in the older ones, till we now have a fleet of 10 Garfords. We were well satisfied with the truck from the first, but did some experimenting to determine what capacity was best for our purpose. At present we have seven 1½-ton, two 2-ton, and one 1-ton trucks.

All our machines are fitted with special bodies of our own patent, designed to protect the furniture on the road. They are used for hauling from the freight depots to the main store, from there to our branch stores, and for city delivery. But their most important duty is making country deliveries.

In making these out-of-town trips, a truck operates over a given route. One day it goes to Norwalk and up Long Island Sound. Another day it goes to White Plains and up the valley road. Another trip takes in Tarrytown and the up-river district. One day it crosses to New Jersey, working from Bayonne to Newark. The distance covered on any of these runs is between 50 and 100 miles.

The number of articles hauled and the weight of the load vary with each trip. Most furniture is bulky but comparatively light in weight. A truck may haul an even ton and a half at a load. Again, three-quarters of a ton may be all we can get on. Our deliveries are promised on a certain date, and we expect the truck to take everything on or along the route it is scheduled for.

Because furniture is bulky but light, our trucks are practically never overloaded. Usually they carry less than their tonnage capacity. But the roads in the country are none too good, and the distances traveled are considerable. It would seem that the wear and tear on our trucks would be very great, but the machines have sood up splendidly under the hard usage given them. Even last winter, when the snow in this territory was unusually bad, they did not miss a single country trip.

It would be impossible to make our country deliveries with horses because of the distances to be traveled. We must ship by either freight or motor trucks. But shipping by freight means delays, breakage, and other inconveniences that we escape altogether by using trucks. And our country business depends so largely upon prompt delivery that it could not be satisfactorily handled by freight.

The record of one of the 2-ton trucks is typical of the performance of the others. The figures given, however, are not an average for the fleet, but are an individual record. This truck has been in service two years. During the year ended July 1, 1920, it operated 306 days, and traveled a total of 23,899 miles, averaging 78.1 miles per day. This truck cost $24.00 per day to operate, or 31 cents per mile. This includes $11.22 per day for driver and helper. As the individual pieces of furniture are often bulky and hard to handle, we always have two men to a truck. The driver also acts as salesman.,

Although we are proud of the fine appearance of our trucks, we bought them for work, not for looks. We drive them hard and long, but give them good care, and are getting splendid service from them.

Operation.

Days operated	306
Miles traveled	23,899
Miles per day	78.1
Miles per gallon of gasolene	7.0
Miles per gallon of oil	85

Average Cost.

Cost per day (including driver and helper)	$ 24.00
Cost per mile	.3073
Total cost for period	7,345.37

Itemized Cost.

Driver cost per day, and helper	$ 11.22
Depreciation per mile	.0363
Maintenance and repair, estimated, per mile	.0167
Tire cost, estimated, per mile	.0262

The Street-Railway's Future

Speaking of the future of electric railways, a writer in the *Electric Journal* states that it is a speculative matter, as the efficiency of the service is not what it used to be. The trolley, at first a fast-moving vehicle, is now no longer the fastest vehicle on the streets. It is hampered by legal restrictions and suffers from four classes of competition: the so-called "jitney," the organized motor 'bus line, the taxicab, and the private motor-car. The "jitney" menace, at first threatening because of lack of regulation, is losing some of its terror through the tendency to class the vehicles as common carriers. The motor 'bus is held to have a field of usefulness, but is considered clumsy, slow, costly in operation, obstructing to other traffic, and unable to handle heavy traffic. The taxicab and private motor-car give speed and comfort to those who can pay for them. Whereas, in the past, the trolleys furnished public transportation and built up suburbs, they will, in the future, probably not assist in city extension, but operate only in congested areas, as in England, becoming less of a factor in local transportation problems with each year.

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Time and Distance in Cost-Keeping

By COLONEL CHARLES HINE

Formerly of the Motor Transport Corps, American Expeditionary Forces

A MOTOR truck with a cargo capacity of 5 tons costs about $5,000 and has a life of about five years. Its expectancy of productive work can not ordinarily exceed 5 days a week or 260 days per year, the other days being idle time due to Sundays, holidays, shop work, painting and business shutdowns.

Good business procedure demands the setting up of an amortization account for every capital expenditure. A $5,000 truck should be amortized on the basis of $4,600, as the tires, costing about $400, are expendible and, therefore, chargeable to operation. Depreciation over five years means $920 per year and the interest charge at 8 per cent. is, for each of the five years in succession, $368, $294.40, $220.80, $147.20, $73.60; total interest, $1,104; total principal and interest, $5,704. For the convenience of a uniform amortization charge it is sufficiently accurate to divide this last total by five years and then by 260 working days which gives $4.38 as a safe charge for amortization for each working day.

The wise purchaser of a truck will at once insure it against theft, fire, accident and liability for damage done to others. Because of heavy claims paid by insurance companies this item is increasing rather than decreasing and may be put at $416 per year or $1.60 per working day.

Another charge that begins to run with ownership is that for taxes, including license or registration. This item is also on the increase owing to a public demand that motor trucks contribute a larger share of the cost of highway maintenance. This may be estimated at $520 per year or $2.00 per working day.

A garage of some kind, public or private, is essential and, including the washing and inspection of a truck, costs about $30.00 per month, $360 per year, or $1.38 per working day.

Assuming the owner to have only one truck and to be his own driver a headquarters' office with telephone service, through which orders may be placed and from which business may be solicited, is necessary. For the owner of one truck this may be arranged with some office existing for other purposes by paying the proprietor, or a clerk, to act as truck representative which, including the use of the telephone, will cost about $45 per month, $540 per year, or $2.07 per working day. As the owner expands his business and increases the number of his trucks he will, sooner or later, need an office of his own with expense for rent, light, heat, telephone, furniture, stationery and clerk hire. The continued allocation of $2.07 per working day per truck should be sufficient for this item.

The owner should allow himself drivers' wages which, with overtime, will run about $35 per week or $7.00 per working day. A helper, or his equivalent in loaders and unloaders, is needed and will cost $25 per week or $5.00 per working day.

The wise owner-driver, on buying his second truck, will cease driving and become a supervisor. As a supervisor he should continue to receive drivers' wages and as owner he should also receive owner's profit. This means that each of the two trucks should be charged with a supervision cost equal to one-half of driver's wages or $3.50 per working day. As the trucks expand in number to a fleet more supervisors become necessary as do runabout cars for use in supervision. A continued charge of $3.50 per truck per working day should cover supervision.

All of the foregoing elements of cost are designated herein as constant elements because they are assumed as functions of time and as being independent of miles run or tons hauled. Amortization is allocated by time units rather than by distance units because of the wide variations in commercial mileage and of the still rapid development of a young art. A new truck, well housed and cared for, left standing idle for five years might be nearly as good as new and yet be much depreciated in value because of better trucks then on the market. Insurance, taxes and garage are manifestly functions of time. The elements of office, driver, helper, and supervision are allocated by time in the belief that no enterprise can long prosper where skilled and faithful men are ruthlessly laid off whenever business slows down. Society, for its own protection, is demanding that industry be so organized and profits be so adjusted as to insure continuity of employment to a normal number of tried and qualified employes. These constant elements may, for convenience, in comparison, be equated in miles or mile-hours where warranted by sufficiently constant and uniform mileage performance.

The five remaining elements of operating cost—cargo insurance, fuel, lubrication, tires, and repairs—are designated herein as variable elements because they are assumed as functions of cargo and distance.

Cargo insurance, because of large claims paid by insurance companies, is increasing in rate. In some cases the rate is said to be nearly prohibitive. This element is the most difficult to estimate and is assumed at $1.57 per working day.

Fuel consumption varies with highway, trucks, cargoes, repairs and drivers. It runs from 4 to 7 miles per gallon of gasolene at a cost of from 4 cents to 7 cents per mile, 6 cents per mile being a safe normal.

Lubrication requires a gallon of oil costing 80 cents for every 150 miles, which, with some special lubricants, gives a normal cost of something like ½ cent a mile.

Tires cost from $400 to $600 a set with varying guarantees by manufacturers as to mileage. Five cents a mile may be assumed as a safe normal.

Repairs, including a periodic overhaul, are found by experience to be about 2 cents a mile. In congested city districts, with many sharp turns and much stopping and starting, it may be found that repair cost increases relatively faster than mileage and varies with time rather than distance.

These five variable elements may, for convenience in comparison, be equated in days or hours where warranted by sufficiently constant and uniform time performance.

Intraurban trucks often make only 20 miles or less per working day and often handle only 20 tons of cargo. Interurban and suburban trucks seldom exceed 100 miles per day.

A trip of about 50 miles and return, or a total of 100 miles, is normally the limit which can be undertaken and permit return to the home garage the same working day. Longer trips usually necessitate an allowance for garage en route and for meals, if not also lodging, for driver and helper. Traffic is seldom balanced in direction. A 5-ton truck is lucky to handle 8 tons in a trip of 50 miles and return.

From these practical assumptions there is derived the table designated herein as a typical formula. It is intended as a rough guide in estimating costs of heavy trucking. Based on high, rather than on low figures of cost it is offered as a safe maximum. Application in a given case with known and actual values substituted for the assumed values will perhaps show the total cost as 10 to 25 per cent. lower than the total of the typical formula.

Typical Formula Covering Costs of Heavy Motor Trucking.

Conditions:- $5,000 Truck, 5 Tons, 5 Years, 5-Day Week, 260 Working-Day Year, 9-Hour Day.

	Dollars per Working Day. (9 hours)	Cents per Truck-Mile, 100 mile-day. (8 tons)	Cents per Truck-Mile, 20 mile-day. (20 tons)
Amortization	4.38	4.38	21.90
Insurance	1.60	1.60	8.00
Taxes	2.00	2.00	10.00
Garage	1.38	1.38	6.90
Office	2.07	2.07	10.35
Driver	7.00	7.00	35.00
Helper	5.00	5.00	25.00
Supervision	3.50	3.50	17.50
Cargo insurance	4.57	4.57	22.85
Fuel	6.00	6.00	6.00
Lubrication	0.50	0.50	0.50
Tires	5.00	5.00	5.00
Repairs	2.00	2.00	2.00
Total	45.00	45.00	171.00
Per hour	5.00	....	.....
Per ton-mile	....	11.25	34.20

It is apparent that it is better for a truckman to base his costs on days than on miles. Neither the ton-mile nor the truck-mile is a safe unit for a truckman. As compared with a railway his tons and his miles are relatively too few to absorb the

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Huge Highway Project Would Cut Transport Costs

Port of New York Authority Is Considering a Broad Plan for Improving Road Transportation

A NEW highway plan has been proposed for New York and neighboring cities which its sponsors say would revolutionize intercity shipments of freight and wipe from the expense column of the average citizen's slate more dollars than he has been permitted to think about saving in several years.

Major Elihu C. Church, transportation engineer of the Port of New York Authority, has laid out on paper a motor trunk line highway designed to have lighter grades and easier curves than those prevailing on most roads. This plan would eliminate all grade crossings, with their attendant delays and dangers. The highway would be equipped, just as railway systems are equipped, with convenient stations, supply depots, telephones and wrecking service. It would be under strict supervision, well lighted throughout, and its traffic handled on definite schedules, the regulation to be as rigid as those on the railroads. Major Church has just presented his plan to the advisory board of the Port of New York Authority, consisting of General George W. Goethals, F. L. Stuart, Morris R. Sherrerd and Nelson P. Lewis.

Surrounding the Statue of Liberty, in a 25-mile radius, there is a territory holding one-twelfth of the population of the United States. Within this circle there are 105 towns and cities, each of whose transportation interests are closely linked with those of the other 104. Four years ago these 105 communities decided that the problems attending their interests were too big to be handled by local efforts, and the Port of New York Authority came into existence.

One-twelfth of the population uses quite a bit of food, wears a good many clothes, listens to many talking machines, walks over thousands of yards of rugs and find several million stewpans and needles and carpet tacks necessary to the pursuit of happiness. The new motor highway plan would make it as easy to deliver all these and many other things anywhere in the 25-mile zone as it now is to send them uptown. It also would provide means for largely increased food shipments.

The million of tons of freight pouring in and out of New York must be handled over and over in the course of distribution. In this handling there has sprung up a business in motor truck intercity shipments of great magnitude, but its possibilities, according to the Port of New York Authority, are almost untouched.

Motor truck transportation under present conditions is limited by two serious difficulties—the danger of accidents and high cost—both due to the necessary use of streets already overcrowded and unfit for motor truck traffic, and of unlighted or badly lighted and unregulated country highways. Many accidents take place at grade crossings, and on dark country roads.

The high cost of motor transit in some instances is explained by the fact that it often costs $3.60 an hour to keep a motor truck going, or, what is more to the point, to keep it standing still. And when it must stand still a large part of the 24 hours waiting for road conditions to become possible for travel, the cost is excessive. At present motor trucks carrying shipments in and out of New York travel almost wholly at night, speeding mysteriously through the darkness singly or in caravans.

"Keeping living conditions at the desired levels of cost and convenience," said Major Church, "demands that these limitations in the possibilities of motor truck distribution be met, understood, and eliminated."

Details of the plan are yet to be decided upon. The advisory board will pick out existing highways in relation to their adaptability. It is not thought likely that many of these will be acceptable. The Boston Post Road and the Lincoln Highway already are so heavily taxed by passenger traffic as to be useless. It appears likely that an entire new system of roads will be suggested.

"Certainly new roads will be demanded in the city," said Major Church. "These must emphatically be either above or below street levels, so as to eliminate the accidents and delays that now make this freightage so unsatisfactory."

As indicated by present plans, the roads would probably be built through the territory under the guardianship of the Port of New York Authority in such a way as to permit further growth to cover three important sections: New York to Bston, tapping Connecticut with its heavy consumption of fruit from New York markets, and beyond Boston feeding the entire New England group of states; New York to Philadelphia, thence to Washington, Baltimore and the South; and New York to Albany, passing through the Mohawk Valley and on to Buffalo.

Major Church has awakened interest in the road project in other cities through chambers of commerce and other public bodies.

Many of the details have been under consideration by road-builders ever since the advent of the motor truck, such as paving, the elimination of grade crossing perils, and lighting. Recently one of the big lighting corporations made a test installation near Swampscott, along a mile of road previously known as Death Highway, using a device for the economical lighting of country roads. The plan has won high commendation from drivers. A nest reflector, or a series of three, one within the other, is the feature of this device, which, it is said, collects the light and reflects it upon the road surface only, instead of wasting it in illumination of adjoining fields. Rays, which would escape if only one reflector were used, are picked up by the inner reflector and directed toward the roadway at an angle of 10 degrees below the horizontal, giving the same effect as if there was an overhead reflector 15 feet in diameter. Illuminating without glare, or without those shadows which create illusions, these fixtures require lamps of only 250 candle-power, which promises to make possible the lighting of roads where, under old lighting systems, the cost was prohibitive.

As to the other equipment promised, telephones, stations, wrecking service, and road rules, "these follow naturally," said Major Church, "the establishment of a motor trunk line highway on a business basis."

Major Church's plans include the establishment of several belt-line highways within the cities traversed by the main route, these crossing and connecting the trunk lines and circling the city streets in broad, sweeping lines. Devoted only to the traffic of the trunk-line system, these would complete the efficiency and safety of the road by simplifying deliveries and keeping freight traffic off the city streets.

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wide fluctuations in individual cargoes and hauls.

It is further apparent that any device like a demountable body or other form of unit container which reduces the standing time of truck must increase the tonnage handled per truck per day, and therefore reduce the cost per ton.

Heil Makes Armored Body

The Heil Company of Milwaukee is making an armored bank body, which is 12 feet 6 inches by 4 feet 6 inches by 5 feet high over all. It is fitted with one door at rear and one door on each side at the front. These doors have special folding steps which are automatically raised as the doors are closed. The sides and rear are covered with No. 12-gage steel. All seams and edges are covered by 1½ inch half oval. The front is fitted with a special heavy glass wind-shield. The three windows on each side in the body proper, as well as the windows in the doors and cab, are of heavy French-beveled plate-glass. The windows are protected with 7/16 inch cold-rolled steel bars held in place by 1½ by 1½ by ¼-inch bound-in angles. The rear fenders are integral with the body. The roof is covered with 10-ounce black canvas duck. The frame proper is made of white oak and ash.

The inner sides are covered with 3-inch cypress ceiling and the roof with 1½-inch cypress and bass-wood alternated, with natural wood finish or stained mahogany finish. The floor is made of kiln-dried white oak. Two hinged seats on the inside, accommodating three guards, are furnished with leather cushions. The driver's seat is separated from the main body compartment with a wood partition containing a window protected with steel bars.

The body is painted on the outside as follows: 1 coat primer, 2 coats of lead, 7 coats filler, 3 coats of color, 3 coats of rubbing varnish, 1 coat of finish varnish. The weight of the body approximately 2,120 pounds.

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The Correct Way to Calculate Truck Tire Costs

By R. D. ABBOTT
Testing Engineer, Miller Rubber Company

DUE to the fact that the motor truck industry has grown into such huge proportions and is so great a factor in the transportation of manufactured goods, farm products and passengers, the question of what is the most economical and efficient tire that can be used is being given considerable thought and attention at the present time. Before this question can be definitely and satisfactorily answered there are quite a few matters to be taken into account.

The type of service in which the trucks are to be used should always be the major consideration of the truck user before he makes his final decision as to what kind of truck he will use. This is not only true of trucks but it also holds good for tires. There is a general type of truck that will meet the demands of all general trucking and, similarly, there is also a general type of tire that will take care of every kind of service to which it may be put. But, where there is a specific service to be rendered, it is much more practical and economical carefully to analyze these conditions in order to determine just which one is best fitted for the job.

The many different types of service required of motor trucks can be divided into several general yet distinct classes, such as light trucking, inter city hauling, heavy trucking, delivery trucking and 'bus service. Each of these requires a different type of truck, and each of these should be equipped, because of efficiency and economy, with a special type tire which has been designed to meet all the demands of this particular type of service.

The secret of successful truck operation in any and all of these branches of trucking depends primarily upon the efficiency of the service rendered. In order to give real service, the truck must be able to make quicker deliveries at the same or lower cost than the railroads and deliver the goods in as perfect condition. For this to be accomplished it will be necessary to select a truck which will be equipped so that it can meet all these requirements.

In the equipment of trucks with pneumatics there is always raised the question of costs. There are still some truck owners who do not yet believe that the larger sizes of truck tires are practical or economical. By their own experience they are thoroughly "sold" on the practicability of the smaller sized pneumatics, but due to the much greater initial cost of the larger tires they are not absolutely sure that this is a practical and economical size. This condition is brought about by an incorrect and illogical computation of tire costs. The average tire user figures the cost of his tires by dividing the total initial tire cost by the number of miles of service which he gets from the tires. This does not take into consideration the pay-load that he is hauling. At a glance, it can easily be seen that this is an erroneous way to figure tire costs, due to the fact that the truck owner does not charge for his trucking by the mile without regard of the tonnage. The basis of his charge is the ton-mile, passenger-mile or package-mile; in other words, when he arrives at a rate of charge for his trucking, it is done in terms of the number of tons, passengers or packages hauled for a certain number of miles. If, then, the revenue which he receives from the truck is based upon the number of tons hauled a given distance, should not his expenses, such as his tire costs, be figured in the same terms?

An example will show more clearly the inconsistency of computing tire costs on a mileage basis alone. In order fully to equip a ½-ton truck with 34 by 4½-inch tires and tubes, including a 5 per cent. war tax, will cost $231.64. Using 10,000 miles as the average mileage delivered by these tires, the cost per mile would be 2.31 cents. To equip completely a 3½-ton truck which uses 38 by 7-inch tires on the front ann 44 by 10-inch tires on the rear, would cost $1,029.10. Using the same mileage basis as on the 34 by 4½-inch tires, it will be seen that the cost per mile would be 10.291 cents, or more than four times the cost on the ½-ton truck. If this were the correct method of figuring tire cost, it would mean that the larger tire would be handicapped at the offset, due to its greater initial cost. But fortunately this cost-per-mile method is not correct either in theory or in practice.

Since the truck owner sets his transportation rates on the ton-mile, passenger-mile and package-mile basis, he is interested in knowing just what it is costing him to haul each ton, passenger or package per mile. If we take the same example as was given above, and compute the tire cost per ton-mile instead of per mile, we find that, allowing for capacity loads both ways for each truck, the cost per ton-mile for the ½-ton truck is 4.63 cents, while that of the 3½-ton job is only 2.94 cents. Hence, it can readily be seen that the larger truck, so far as tire costs are concerned, can be operated at a profit as well as, or even more easily than, the smaller one.

The cost-per-mile method does not take into consideration the fact that the larger tire on the larger truck makes it possible to haul larger loads and thereby gives the truck a much greater earning capacity. This method of computation also places a limitation on the truck because it shows that, in order for the larger trucks to be self-sustaining or to operate at a profit, it would be necessary to make exorbitant charges, which fact in itself would eliminate heavy freight from the realm of motor trucking. However, when tire costs are placed upon the ton-mile basis it will be shown that not only is the per-mile method not correct, but that it actually costs anywhere from 30 to 50 per cent. less, so far as tire costs are concerned to operate the larger truck than the smaller one.

It is a well-determined fact, conceded by many truck owners, that the cost of pneumatic tires on light delivery trucks is not excessive. Proof of this point is found in the fact that pneumatic-tired light delivery trucks are so generally used and are operated with entire satisfaction. By a comparison of tire costs, which has been shown above, it is seen that the larger sized tires actually cost less per ton-mile than the smaller ones and, consequently, the use of larger pneumatics is just as economical and practical as that of the smaller ones.

The passenger-mile or package-mile tire cost may be figured in the same manner in which the ton-mile cost is computed. For example, we will take a 'bus which is equipped with 34 by 4½-inch tires. This 'bus is run on a 5-mile route and carries an average load of 10 passengers. Then, at the completion of one round trip the 'bus has done work to the extent of 100 passenger-miles. Using 10,000 miles as an average for the tires, the 'bus will make 1,000 round trips before the tires are worn out, or the tires will have done work to the extent of 100,000 passenger-miles. The intial equipment of 34 by 4½-inch tires and tubes costs $231.64 and they have performed 100,000 passenger-miles of work. Hence the tire cost per passenger-mile is 0.231 cent. By the same method of figuring a larger passenger 'bus, equipped with 38 by 7-inch tires on the front and 44 by 10-inch tires on the rear, which carries an average load of 40 passengers, will show a tire cost of 0.257 cents per passenger-mile.

The basis used for deriving the above figures is 10,000-mile tire life and a constant pay-load of the rated capacity of the truck. Of course, it is realized that this is an assumed case, because trucks are rarely loaded to capacity at all times, but the load varies in about the same ratio in all lines of trucking.

In order more clearly and completely to show the exact relation of tire costs on different sized trucks the following table of costs is given:

Capacity of Truck.	Proper Tire Equipment.	Initial Cost.	Cost Per Mile.	Ton-Miles Traveled.	Cost Per Ton-Mile.
½-Ton	34x4½	$ 231.64	2.31c	5,000	4.63c
¾-Ton	34x5	265.88	2.66c	7,500	3.54c
¾-Ton	35x5	287.48	2.87c	7,500	3.83c
1 -Ton	34x5 F 36x6 R	319.32	3.19c	10,000	3.19c
1 -Ton	35x5 F 36x6 R	330.12	3.30c	10,000	3.30c
2 -Ton	36x6 F 38x7 R	456.54	4.56c	20,000	2.28c
2½-Ton	36x6 F 40x8 R	533.20	5.33c	25,000	2.13c
3 -Ton	36x6 F 42x9 R	729.76	7.29c	30,000	2.43c
3½-Ton	38x7 F 44x10 R	1,029.10	10.29c	35,000	2.94c

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Gotham 'Buses Show Very Successful Record for 1921

NET INCOME BIGGER; SOME COSTS LESS

The annual report of the Fifth Avenue Coach Company, New York, covering its operations in the motor 'bus service of that city for the fiscal year of 1921 has just been made public and it contains evidences of the improving position of the company with respect to efficiency and economy. As a net result of the year's business the corporation's surplus has been increased by $457,792.57, while the net income shows a growth of $332,943.94. Although there was no increase in the rate of fare as on the street-car lines, the company has achieved an increase of more than 7 cents per 'bus-mile in the total revenue from operation, with an increase of less than 4½ cents per 'bus-mile in operating expenses, including taxes. The net increase in the income from operations amounts, therefore, to 2.58 cents per 'bus-mile, which is a highly commendable accomplishment. The number of passengers carried during the year increased 8,538,656 with an increase of only 18 in the number of 'buses in operation. In spite of increasing costs, the tire bill shows a drop of 0.11 cents per 'bus-mile, and the repair costs increased but 9 mills per 'bus-mile. A complete summary of the company's operations is given in the appended table.

Sharon Pressed Steel Company

The reorganization and refinancing of the Sharon Pressed Steel Company have been completed, and its financial statement of November 21 shows a satisfactory condition of affairs. Since being taken over on February 28 by Henry W. Torney of Torney & Company, Inc., as president and by Arthur E. Swan, formerly chief engineer of the Crucible Steel Company, the plant at Sharon has been operating continuously and has shown a steady increase in output each month. To-day it is running at about 50 per cent. of its normal capacity.

The refinancing has been in the hands of Josiah Kirby of the Cleveland Discount Company, who is a director and large stockholder in the Sharon Company. The plans outlined warrant the company in going forward on energetic lines to bring the plant up to 100 per cent. on the standardized articles it produces. The Sharon line consists exclusively of pressed-steel products such as motor truck and car frames, clutch disks, brake drums step hangers, torque arms, etc.; railway car roofs and specialties; industrial trucks and trailers, platforms, skids, etc. Production is in charge of Arthur E. Swan as general manager and a corps of engineers specializing in pressed-steel work. The location of the plant at Sharon in the Shenango Valley gives the company every advantage in price and supply of raw materials; and the labor facilities are superior to those obtaining in other localities in similar lines of manufacture. Sales are under the direction of Russell B. Reid, general sales manager.

The City of London, England, has displaced its last fire department horses and the entire city fire-protection service is now on a motor basis.

SUMMARY OF THE OPERATIONS OF THE FIFTH AVENUE COACH COMPANY FOR THE YEAR ENDED JUNE 30, 1921.

Statement of Operations.

	Per 'bus-mile 1920.	Per 'bus-mile 1921.	1921. Amount.	Increase or (D) decrease.
Number of omnibuses (exclusive of 50 non-revenue 'buses and cars)			289	18
Round trips made during the year			619,151	50,019
Revenue 'bus-hours (including 2,865 "private hire")			1,128,277	22,342
Revenue 'bus-miles (active 9,010,047; idle, 164,140; "private hire," 17,638)			9,191,825	395,630
Number of passengers carried at 10 cents			51,091,365	8,538,656
Total amount of fares	48.37	55.58	$5,109,136.50	$853,865.60
Revenue from livery service	0.33	0.16	14,607.70	D14,101.80
Advertising privileges and miscellaneous	0.80	0.82	75,191.85	5,223.11
Total revenue from operation	49.50	56.56	$5,198,936.05	$844,985.91
Maintenance (a):				
Superintendence, $86,418; shop expenses, $27,288.44	1.17	1.24	$ 113,706.44	$ 11,323.88
Repairs (omnibus bodies and chassis, $476,725.27)	4.61	5.51	506,071.79	99,833.02
Tires (b)	0.98	0.87	80,370.31	D5,693.78
Depreciation (reserved)	2.42	1.57	144,502.57	D68,505.66
Total maintenance	9.18	9.19	$ 844,651.11	$ 36,957.46
Conducting transportation	23.23	25.18	2,314,778.97	270,884.65
Accidents and damages (c)	1.35	1.87	171,585.79	52,929.49
Traffic, advertising	0.16	0.24	22,501.73	8,593.59
General and miscellaneous	1.62	1.71	157,005.02	14,664.77
Total operating expenses	35.54	38.19	$3,510,522.62	$384,029.96
Taxes	4.66	6.49	596,648.39	186,922.69
Total revenue deductions	40.20	44.68	$4,107,171.01	$570,952.65
Income from operations	9.30	11.88	$1,091,765.04	$274,033.26
Non-operating revenue (rent, $18,208.29; interest, $75,014.34)			$ 93,222.63	$ 42,922.52
Non-operating revenue deductions			15,654.72	14,979.60
Non-operating income			$ 77,567.91	$ 27,942.92
Gross income applicable to corporate and leased properties			$1,169,332.95	$301,976.18
Income deductions (rent, $51,039.68 and interest, $567.54)			51,607.22	D30,967.76
Net income for year			$1,117,725.73	$332,943.94
Surplus adjustments—net deductions			(d)19,472.96	D124,848.63
Net increase in corporate surplus			$1,098,252.77	$457,792.57

Employees: Last pay-roll of June, 1921: Conductors, 432; drivers, 411; others, 478; total, 1,321. Total salaries and wages, $2,416,930.93 (inclusive of officers, $69,898.66), increase over 1920, $367,248.80.

Accidents—Killed, 3; injured, 809 (serious 27, minor 782).

(a) The rule of the Fifth Avenue Coach Company concerning Depreciation of Equipment, filed with the Commission, provides for a charge to expense from January 1, 1919, "equal to 9.15 cents per 'bus-mile, which is estimated to be sufficient and necessary to cover such wear and tear and obsolescence and inadequacy as may occur on all equipment." The basis includes non-revenue mileage (30,290). The amount reserved after deducting the cost of repairs comprises $117,372.43 for depreciation of equipment, $16,351.25 buildings and $10,778.89, shop tools and machinery.

Balance Sheet.

ASSETS.

	As of June 30 1920.	As of June 30 1921.	Year's increase or (D) decrease.
Cash	$ 339,436.51	$ 344,555.92	$ 5,119.41
Accounts receivable	38,665.71	227,913.37	189,247.66
Interest and dividends receivable	8,133.76	21,089.84	12,956.08
Materials and supplies	317,662.22	352,372.57	34,710.35
Total floating capital	$ 703,898.20	$ 945,931.70	$ 242,033.50
Motor 'buses	$1,235,537.66	$1,353,235.24	$ 117,697.58
Shop and miscellaneous equipment	174,764.68	207,579.50	32,814.82
Office furniture and fixtures	12,064.71	16,725.58	4,660.87
Organization	25,105.27	25,105.27	.....
Real estate	298,919.13	298,919.13	.....
Garage	817,561.81	817,561.81	.....
Total fixed capital—gross	$2,563,953.26	$2,719,126.53	$ 155,173.27
Accrued amortization of capital—credit	716,845.24	(e)824,098.21	107,252.97
Total fixed capital—net	$1,847,108.02	$1,895,028.32	$ 47,920.30
Miscellaneous investments	$1,032,669.13	$1,953,323.88	$ 920,654.75
Construction in process	84,621.39	2,915.55	D81,705.84
Prepayments	38,461.09	43,445.28	4,984.19
Guaranteed cost of tires in service (b)	29,676.56	14,232.67	D15,443.89
Total—assets side	$3,736,434.39	$4,854,877.40	$1,118,443.01

LIABILITIES.

Taxes accrued	$ 417,361.89	$ 535,166.21	$ 117,804.32
Miscellaneous accounts payable	184,922.05	266,006.86	81,084.81
Working advances due to associated companies	.....	4,166.67	4,166.67
Interest accrued	3,719.96	.....	D3,719.96
Funded debt (purchase money mortgage on garage)	175,000.00	.....	D175,000.00
Reserve for injury and damage (claims)	155,966.42	169,049.23	13,082.81
Other reserves	29,884.13	f12,655.72	D17,228.41
Capital stock	50,000.00	50,000.00	.....
Corporate surplus	2,719,579.94	3,817,832.71	1,098,252.77
Total—liabilities side	$3,736,434.39	$4,854,877.40	$1,118,443.01

(b) Reported as depreciation of tires. Based on the "'bus-tire mileage" at the guaranteed tire cost per mile, credit being made for tires which exceed the guaranteed mileage and for scrap.

(c) For payment of claims the company charged expenses (and credited reserve) at the rate of 1 cent per 'bus-mile until December 31, 1920, and thereafter at rate of 1¾ cent. Credits exceeded the payments this year by $13,082.81.

(d) Debits: Obsolete parts scrapped, $12,513.96; adjustment of federal taxes for period January to June, 1920, $4,574.38; 5 per cent. of receipts from advertising from October 1 to December 31, 1919, paid to the City of New York, $810.05; unamortized cost of equipment retired during the year, $456.81; loss on securities sold and matured, $311.11; adjustment of items pertaining to prior periods, $1,431.56; bad debts written off, $124.25. Credits: Bad debts collected, $266; unclaimed wages, year 1918, $483.16.

(e) Depreciation of equipment, $718,371.37; shop tools, etc., $50,870.42; buildings, $54,856.42.

(f) Reserve for depreciation of uniforms, $2,251.75; for improvements to leasehold property, $4,977.02; reserve for workmen's compensation, $5,426.95.

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Los Angeles to 'Frisco by Motor

California Motor Transport Company Operates a Fleet of One Hundred and Fifty-nine Motor Coaches Over 600 Miles of Mountain Highways of the Golden State

TO a person unfamiliar with the Pacific Coast one of the most novel features is the manner in which the various motor coach lines link up all the important centers and even radiate out to the smallest villages. In southern California, where oranges are the biggest and real estate men the boldest, one company has developed a system of stage lines that also calls for the superlative in a description of the extent of the service offered, number of passengers carried and the equipment operated. This is the Motor Transit Company with headquarters in Los Angeles.

From a small beginning in 1917 this concern has expanded steadily but rapidly until in April, 1921, it was operating a fleet of 150 motor coaches with lines from Los Angeles to San Diego, Santa Ana, Riverside, Redlands and Bakersfield, with direct connections for all San Joaquin Valley points and San Francisco at the last-named city. From San Bernardino, on the Redlands line, a route through the mountains 101 miles long has its starting point—the "Rim of the World Drive." It is now possible for one to leave Los Angeles at 7 A. M. and be in San Francisco, 425 miles distant, by 11:30 that night, riding in a coach operated on schedule all the way. The Motor Transit Company alone operates over 600 miles of highway, all of which is paved except for the major part of the "Rim of the World Drive," which lies in the mountains and reaches an altitude of over 8,000 feet. In fact, it would be impracticable to maintain regular service at a profit on intercity lines over anything but hard-surfaced highways.

Just as was the case with the electric railways, this new means of transportation has created traffic. Undoubtedly it does cut somewhat into the business of the railroads on the shorter hauls, but it originates a very large share of its business, and the habit of travel developed is the source of more profitable passengers for the railroads than are taken from them. The coach lines reach small towns and farming districts which were before without adequate transportation facilities, and the frequent service furnished is used. Extensive advertising campaigns have been carried out at frequent intervals in which a great deal of space is used. Because of the nature of the commodity for sale—local transportation—this advertising must be largely local in character, but the newspaper campaign is supplemented by the continuous distribution of great numbers of booklets, time cards and a bi-monthly magazine, largely through bulletin racks in depots, travel bureaus and hotels. One hundred thousand pieces of such advertising material are being distributed monthly. Not only is more frequent service provided than it would be possible for a railroad to give, but a material reduction in fares is made. On the roads over which the motor companies operate, their cars make up a very small part of the total traffic, and the public receives compensating benefits in better service and lower fares as well as in the high license fees paid. On the runs through reasonably level country, the rates are based on 2½ cents a mile, to which the government war tax of 8 per cent. must be added. Round-trip and commutation tickets are sold at material reductions. Compared with the 3.6 cents per mile charged by the railroads, plus war tax, these rates offer a saving of over 30 per cent.

Two distinct types of vehicles are operated by the Motor Transit Company, one on local runs and one on the long-distance routes. To San Bernardino, Redlands and Riverside, where much of the traffic is from terminals to intermediate points or from station to station, 24-passenger street-car type 'buses are used. These have a center aisle and a door at the front operated by the driver. Before the car is started the door must be closed and the steps folded up as in street-car operation. In this way danger from passengers leaving or entering while the 'bus is in motion is eliminated. The driver punches the ticket when the passenger enters and collects it when he leaves so that the ticket serves as a destination check. Two-ton White truck chassis are used in the service, but all the bodies are now being built by the Motor Transit Company, the gears being changed to meet the operating conditions. Dual 37 by 5-inch cord pneumatic tires are used on the rear wheels and 35 by 5-inch cords in front. One of these 'buses in local service not long ago made a record of 9,600 car-miles, including frequent stops, in 30 consecutive days.

For the San Diego and Bakersfield runs the company is placing in service as fast as possible 11-passenger cars with touring bodies on ¾-ton White truck chassis. The machines used chiefly in the past have been touring cars with an extended wheel-base and an extra seat, giving space for 8 passengers and the driver. Larger cars are needed, however, even on the longer runs. Hand baggage is carried on a frame fastened to the rear end of the car, and trunks are handled by truck. On the rear wheels, flat-tread tires 36 by 6 inches in size are used. These tires are manufactured especially to meet the needs of stage operation. All the equipment is on pneumatic tires, which save the road surface many shocks and the passengers many jolts and also lessens wear on the car, even when operated at higher speed than would be possible with solid tires.

A separate tire department is maintained and careful attention is given to the various troubles found on the different routes and over different types of pavement, and an accurate record of the mileage secured is kept. The most important factor in the deterioration of tires has been found to be the heating, which ultimately so weakens the carcass that the tire must be discarded. Heating is caused by under-inflation and by the effect of the soft-topped roads in warm weather. Of these two causes, the first is not so serious as it can be controlled by the driver, but the second can not be avoided when the black surface becomes hot and soft. Under such conditions blowouts are more frequent due to the expansion of the heated air. The effect on the carcass however is of much greater importance. On reasonably straight sections of road there is not much difference in tread wear on the different types of pavement. Where the route is continually turning and twisting around the mountain side, as on the Ridge route to Bakersfield, treads probably wear off somewhat faster on the concrete surface than would be the case with the soft-top roads. But in view of the practicability of retreading tires at a moderate expense, this is not a serious objection and, in fact, is much more than balanced from the standpoint of operating expense by the freedom from deterioration by heating, reduced gasolene consumption due to lower tractive resistance, and the greater speed permitted. Particularly in wet weather the drivers agree that tires hold much better on plain top concrete than on any other type encountered. On the scenic Ridge route—a highway-building achievement of the first magnitude—fortunately the pavement is of this type for practically the entire 35-mile section in the mountains, for there skidding would often mean a plunge downward for many hundred feet. All curves are super-elevated, which also adds much to the safety of the road.

On both the Bakersfield and San Diego runs there are sharp turns which put a very heavy strain on the tire beads, sometimes even tearing them off if the curves are taken at high speeds. The special tires now being manufactured for the company have unusually heavy beads to avoid this difficulty. To eliminate excessive tire wear and danger, curves should be constructed with at least a 1,000-foot radius wherever practicable and with a clear-sight distance of 500 feet. A saw-tooth grade may even lessen operating costs as it aids in building up speed so long as the grades are within 6 to 8 per cent. and the rise and fall are about equal. Long grades do materially increase the cost of operation; on the Ridge route, where an ascent to over 4,200 feet is made at El Tejon pass and where there are 1,140 curves in 35 miles, it costs approximately 50 per cent. more to maintain a car in service than on the routes without this long climb and multitude of curves. But on roads through ordinary country, gradient can be sacrificed to alignment with advantage from both the standpoints of operating expense and safety.

In Los Angeles the Motor Transit Com-

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pany, in connection with the other stage lines, maintains a large union terminal, and a similar plan is followed in all the other important centers reached. At Los Angeles an information clerk is on duty and several ticket windows are maintained. Seats are sold on specific cars and, when the demand is sufficient, additional cars are despatched at the scheduled leaving time. As many as 25 machines have gone out from San Diego for Los Angeles as rapidly as they could be loaded and started after some of the big racing events at Tia Juana, Mexico, which is 15 miles south of San Diego.

At the terminals oilers are always on duty. All trouble on the in-trip must be reported promptly by the driver and mechanics at the company's garage at once make any repairs needed. On the Eastern Division service begins at 6 A. M. and ends at midnight. Experience has shown that the maximum service that can be secured from a machine is for about 75 per cent. of the time, based on an 18-hour day, as for the remaining 25 per cent. of the time the car is idle, being either kept in the shop for repairs and overhauling or held in reserve for peak loads.

The company in the past has secured about 50,000 car-miles per annum from each machine. In January, 1921, the car miles operated totaled 515,000 and there were 179,372 revenue passengers carried during the month.

Motor coach operation is under the jurisdiction of the State Railroad Commission, which grants a franchise for any line only when the company can show the need of service on that route and further that it can provide adequate service. The company must be in a position to handle both local and through traffic and to provide enough cars to take care of the business offered. Under this plan if hostile interests are not permitted to force through legislation taxing or regulating the motor companies out of business, a still further expansion and development of motor service can be confidently expected. California has provided a network of paved highways connecting the principal centers and is now rapidly continuing the work, and one of the resulting benefits to the public is this new means of rapid, convenient and economical transportation—the motor coach.

Travel by motor coach has become so popular on the Pacific Coast, and particularly in southern California, that until a short time ago operating officials were kept busy day and night finding the proper equipment and drivers to carry the people, without bothering much with a study of details of operation. But the business is now firmly established and an investigation of various phases of operating practice made recently on lines of the Motor Transit Company, Los Angeles, has brought to light some interesting facts, especially about tires. As a result, the tire manufacturers are furnishing a special flat-tread tire for use on the 125-mile runs of the company to Bakersfield and San Diego.

For 18 hours a day, some of the stages are in service. One of the 2-ton cars on the San Bernardino line made 9,600 miles in 30 consecutive days as already stated, and this was on a local run with frequent stops to unload or take on passengers. Under such conditions deterioration due to the atmosphere or to the hardening of the rubber is negligible, although on private passenger cars it is frequently important. In this service tires actually wear out from use.

Heating of tires is the most important single factor in their deterioration, due to the consequent weakening of the cushion stock and the breaking down of the carcass. Once the carcass loses its vitality, the tire is worthless. Under-inflation is one cause of heating, as is well known. Another cause of greater importance is warm weather, since it can not be controlled by the car user, is the effect of some types of road surface. On "black-top" roads the soft, hot material may raise the temperature sufficiently to injure seriously the tire carcass, thereby greatly reducing the mileage secured. Due to heating, blow-outs are experienced more frequently on these surfaces than on those known as "white roads"—plain-top concrete.

Wear on treads is of less importance, except perhaps on certain mountain roads where the continual turning causes rapid wear unless the car is handled very carefully. The feasibility of adding new treads at a moderate cost to a tire otherwise sound lessens the loss from worn treads. A tire so rebuilt should be good for at least two-thirds of its mileage on the original treads. There is not much to choose between the usual types of pavement so far as tread wear is concerned, except that the tractive resistance, as found by tests made at the University of California for the California Automobile Association, is much greater on the soft-top road, and this means more pull on the tire and of course a greater consumption of gasolene.

On roads with sharp turns the wear on the treads is likely to be rapid and occasionally the beads are even torn loose. The remedy here is to slow down on the tangent and to enter the curve at a slow speed. It is essential that the brakes be absolutely free so that the full value of the differential may be secured. Otherwise the outer wheel must slide to keep up with the inner one, and tire wear is of course rapid. After the car is started around the curve power can be put on without detriment. All drivers of the Motor Transit Company are carefully instructed as to the manner of taking curves.

The tire manufactured for the Motor Transit Company is a 36 by 6-inch, with a flat tread which distributes the weight over a greater area and furnishes a better grip on the road. It was developed as a result of tests and observations made by Leon Utter for the Mid-Continent Tire Manufacturing Company. By a special curing process a very tough tread is obtained. Then a continuous cover strip is placed between the tread and the softer cushion stock in order to avoid injurious heating so far as possible. The carcass is made from Egyptian cotton and the cords are carefully rubber-coated, or frictioned, in calendars. The beads are made unusually heavy. A similarly built tire, but with a rounded tread, is used on the front wheels.

In motor coach operation the element of safety is of the utmost importance due to the responsibility of the company in case of accident. This is one reason for the use of the flat-tread tire on the rear wheels, as every time the car skids there is a potential accident. When this element of safety is considered in addition to the several factors entering into tire wear, it is evidently fortunate for the car-owner that the present California practice is to build plain-top concrete pavements. The even yet gritty surface of this material affords a hold for the tire on the wettest day. Further observation of motor coach operation will doubtless result in continued improvement in tires for this special service and should also provide suggestions of much value in the manufacture of tires for automobiles in private use.

By completing a run of 20,000 miles in 61 days, one of the company's 'buses has established a record for mileage and endurance probably never before equalled by automotive equipment. The 'bus that made this record is stage No. 61 of the Motor Transit fleet, running between Los Angeles and Redlands. The exact distance is 72.2 miles and the two months' mileage of 20,000 miles means over 69 round trips per month and uninterrupted running averaging nearly 2¼ round trips a day. Only two drivers alternated at the wheel for the entire period. Coach No. 61 is still running and its steady schedule continues. Number 61 carries 21 passengers and driver and has been in continuous operation since April, 1920.

New Sanford Model

Announcement of the addition of a new light model and the return of its former chief engineer, J. E. Gramlich, has been made by the Sanford Motor Truck Company. Much of the credit of the great success of the Sanford heavy-duty trucks is due to Mr. Gramlich who designed the present 2½-, 3½- and 5-ton models.

To supplement its line of heavy-duty trucks and to meet the demand for a light, strong, and speedy truck, the Sanford company is bringing out a 1½-ton model with considerable overload capacity, and equipped with electric starting and lighting outfits, pneumatic cord tires, and other modern devices, and capable of sustaining a speed of 25 miles the hour if necessary. It is built for hard service and to satisfy the need for a strong, compact, flexible truck.

Painter Joins Disteel Wheel

John G. Painter, for a number of years identified with the sale of Continental engines, has joined the Detroit Pressed Steel Company, as a special representative in the Disteel wheel factory sales division. Mr. Painter resigned as sales manager of the Continental Motors Company more than a year ago to give his attention to another project in which he had a large interest.

Contracts for 95 miles of Illinois highway were let on October 14 by the state at a cost of $2,597,769, an average of $27,359 a mile. Colonel Miller, Director of Public Works, stated that if the contracts had been let last February the cost would have been $3,800,000, or an average of $40,000 a mile.

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Truck Exports Show Increase During October

Mexico Takes Most and Cheapest Trucks, While Brazil Takes Most Expensive Units

A DECIDED improvement is noticeable in the exports of motor trucks and passenger-cars during the month of October, as compared with the previous month. The increase in passenger-cars exported amounted to 6 per cent. in number and 4 per cent. in value; in motor trucks, 26 per cent. in number and 57 per cent. in value. The value of total automotive exports, including airplanes and motor-cycles, increased 8 per cent. in October, as compared with September, and decreased 79 per cent. as compared with October, 1920.

Exports of motor trucks made a far better showing than those of passenger-cars. Exports of both complete cars and chassis increased not only in number but also in value. This increase for complete cars in October, 1921, compared with September, 1921, amounted to 6 per cent. in number and 3 per cent. in value; for chasis the increase was 46 per cent. in number and 110 per cent. in value. It is noticeable that the increase in chassis exported greatly exceeds that of complete cars exported; this may be the result of high duties imposed in many countries upon the importation of bodies and the relative cheapness of manufacturing truck bodies, as compared with the high cost of duty and freight on their importation. In September, 1921, the number of motor trucks exported was evenly divided between complete cars and chassis; in October complete cars made up 43 per cent. and chassis 57 per cent. An increase of $249 is noticeable in the unit value of trucks in October, 1921, over that of the previous month and a decrease of $384 as compared with October, 1920.

Exports of complete cars alone were, as regards value, 8 per cent. greater in October than in September; exports in chassis alone were 13 per cent. smaller. The total exports of passenger-cars for October were made up, as to number, of 77 per cent. complete cars and 23 per cent. chassis; as to value, 83 per cent. were complete cars and 17 per cent. were chassis. A comparison with October, 1920, shows a decrease of 80 per cent. in the number of passenger-cars exported and 87 per cent. drop in value. The unit value of passenger-cars exported during October, 1921, decreased $433, or more than one-third of the unit value of a year ago. There was also a decrease of $14 as compared with September, 1921.

Detailed figures of truck, car and parts exports from the United States for October, 1921, are given in the following tables:

Automotive Exports, October, 1920 and 1921.

Item.	October, 1920 Number.	Value.	Unit Value.	October, 1921 Number.	Value.	Unit Value.	Per cent of Increase(+) or Decrease (—). Number.	Value.
Motor trucks	2,435	$4,025,161	$1,653	595	$ 755,096	$1,269	—75	—81
Complete	1,551	2,358,053	....	254	244,669	....	....	....
Chassis	884	1,667,108	....	341	510,427	....	....	....
Passenger-cars	11,562	14,699,402	1,271	2,329	1,952,641	838	—80	—87
Complete	10,595	13,586,255	....	1,791	1,621,471	....	....	....
Chassis	967	1,113,147	....	538	331,170	....	....	....
Parts	.....	6,910,538	....	.....	2,702,002	....	....	—61

Automotive Exports, September and October, 1921.

Item.	October, 1921 Number.	Value.	Unit Value.	September, 1921 Number.	Value.	Unit Value.	Per cent of Increase(+) or Decrease (—). Number.	Value.
Motor trucks	595	$ 755,096	$1,269	472	$ 481,664	$1,020	+26	+57
Complete	254	244,669	....	239	238,610	....	....	....
Chassis	341	510,427	....	233	243,054	....	....	....
Passenger-cars	2,329	1,952,641	838	2,197	1,870,770	852	+06	+04
Complete	1,791	1,621,471	....	1,631	1,493,019	....	....	....
Chassis	538	331,170	....	566	377,751	....	....	....
Parts	....	2,702,002	....	....	2,570,860	....	....	+ 5

Truck Markets in October, 1921.

Destination.	October, 1920. Number.	Value.	September, 1921. Number.	Value.	October, 1921. Number.	Value.
Mexico	123	$ 219,613	72	$ 51,031	177	$ 70,508
Brazil	(1)	(1)	2	2,200	75	283,750
Canada	76	146,189	95	117,000	68	105,793
Netherlands	(1)	(1)	18	15,483	60	51,309
United Kingdom	276	317,575	54	79,674	53	58,527
Japan	36	50,059	102	55,256	50	25,000
British Oceania	54	108,026	13	24,428	21	36,715
Other countries	1,870	3,183,699	116	136,592	91	123,494
Total	2,435	$4,025,161	472	$481,664	595	$755,096

The markets for motor trucks, according to October shipments, can be divided into four groups: (a) Mexico, Brazil and Canada; (b) Netherlands and the United Kingdom; (c) Japan and British Oceania; (d) all other countries. The grouping is the same for number and value of exports. The percentage of shipments to group (a) is 54 per cent. in number and 61 per cent. in value; to group (b) 19 per cent. in number and 15 per cent. in value; to group (c) 13 per cent. in number and 8 per cent. in value; to group (d) 14 per cent. in number and 16 per cent. in value. According to the number of trucks exported, Mexico heads the list; it is only third, however, as regards value of shipments. Exports to Brazil are first in value. The best market for low-priced trucks, considering both number and unit value, is Mexico (the exceptionally low figure can be explained only by the heavy importation of low-priced chassis and second-hand army trucks). By far the best market for high-priced trucks is Brazil.

A comparison of October shipments with those of the month of September shows that Japan has fallen behind; whereas it headed the list as to number in October, in September it ranked sixth. Canada and Mexico held their own in both months. The United Kingdom, which headed the list in number of trucks taken in October, 1920, dropped to fourth place in September, 1921, and to fifth in October. Peru and Cuba, which occupied second and third place in number of shipments during October, 1920, fell far behind; the Netherlands, on the other hand, counted little during 1920 but developed into an important market during the fall of 1921. The following figures show where truck exports went:

A detailed report of the October reports is given on page 32.

Trucks Bring Better Railroad Service

The Michigan Central Railroad has inaugurated a system of fast daily local freight trains, running on express schedules, from Lansing to many points in Michigan, to compete with various motor truck lines centering there. It is predicted that if these experiments successfully cope with the truck competition, the service will be extended.

No motor trucks are produced in Belgium aside from the so-called camionnettes, which are light delivery bodies mounted on 10- or 15-horse-power chassis.

Germane Joins Gilliam

With the ushering in of the New Year, Frank M. Germane, for so many years associated with the old Standard Roller Bearing Company of Philadelphia and its later evolution into a subsidiary of the Marlin-Rockwell Corporation, takes up his newer activities with the Gilliam Manufacturing Company of Canton, Ohio. Mr. Germane has been elected a vice-president as well as a member of the board of directors of the Gilliam company and will have charge of the line of taper-bearings manufactured by it. He will open an office in Philadelphia in the Bellevue Court Building, which will serve as his headquarters for the eastern territory, but his activities will take him to every section of the automotive industry.

Ruggles Elects Officers

The Ruggles Motor Truck Company, Saginaw, Michigan, which recently acquired the Huron Motor Truck Company, has elected the following officers and directors: Frank W. Ruggles, president; W. J. Wickes and Julius B. Kirby, vice-presidents; Ezra L. Smith, secretary; Charles T. Kerry, treasurer; John F. O'Keefe, counsel; directors, the officers and Benton Hanchett, Otto L. Dittmar, H. T. Robinson, Guy S. Garber and Walter C. Hill, all of Saginaw; Harry H. Price, Columbus, Ohio; John J. Thorne, Bay City; John Ryan and Albert E. Sleeper, Bad Axe.

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Felton Sees Great Future for Motor Transportation

DOUBTS RAILROAD'S OMNIPOTENCE

Samuel M. Felton, president of the Chicago Great Western Railroad, has made an extensive tour of Europe and has provided some interesting details concerning the latest developments in transportation in a recent article in *Collier's Weekly*. Some of his remarks touching the use of motor trucks in commercial freight and passenger traffic and the possibilities for commercial aviation follow:

"In England there is not much domestic flying, for the distances are hardly great enough, but they have developed to a remarkable degree the use of the motor truck and on a strictly business basis. Motor transportation has two phases: first as a competitive carrier, and second, as an auxiliary to the steam railways. Before the railway strike, indeed from time immemorial, cotton from Liverpool to Manchester went by rail; now it is going by motor truck, and the finished product is coming out by motor truck. Much of the coal is being handled by trucks. The English roads are good, as are also those on the continent, the distances are short and heavy grades are few. The conditions are ideal and, with the general use of trailers, the costs are below those of the railways. I have seen steam trucks with as many as four trailers.

"The short-haul traffic has always been profitable abroad, and now the railways are trying to find ways and means to get it back from the motors. My friend, Sir Sam Fay, general manager of the Great Central in England, told me that he was afraid that the railways had permanently lost this short-haul traffic, and he did not quite know how it would affect future earnings. But the railways themselves also make use of the truck and have developed a picking-up and delivery of freight that is not only cheap for the shipper, but profitable to the roads. Much the same situation exists in France and Germany.

"But the real point of interest to me is not that airplanes can safely carry passengers or that motor trucks can handle short hauls cheaper than can the railways, but the influence that airplane travel is going to have upon business and social development and the change that the motor truck will make in transportation. Those who are old enough will remember that when the long-distance telephone came into general use it was thought that it would cut down fast passenger travel. For a time it did, but then it stimulated fast travel and, as much as anything, forced on the fast trains. The telephone developed business—the late George W. Perkins always held that it was the telephone and telegraph that made possible the big corporations. What great change in business will air travel effect in America? What will it do for Europe?

"And then there is another phase: the fast passenger train has made necessary heavy rails and ballasting; these have vastly increased the cost per mile of the most expensive part of a railway—the roadbed. The fine roadbeds which we have are not necessary for freight trains. And the roadbed, although the biggest investment, is the least used part of a railway—which increases the tariff rates. Again, our roads lose money on long hauls of slow-moving freight. Will the airplane and the motor truck serve to help solve the railway problem of the future by cutting out the fast passenger trains, the short-haul freight trains and the expensive passenger terminals? There is a good deal to think about."

EXPORTS OF MOTOR VEHICLES AND PARTS, OCTOBER, 1921.

Countries.	MOTOR TRUCKS Complete. (No.)	MOTOR TRUCKS Complete. (Value)	MOTOR TRUCKS Chassis. (No.)	MOTOR TRUCKS Chassis. (Value)	PASSENGER-CARS Complete. (No.)	PASSENGER-CARS Complete. (Value)	PASSENGER-CARS Chassis. (No.)	PASSENGER-CARS Chassis. (Value)	PARTS. (Value)
Austria	..	.....	...	.....	.....	.....	...	.....	$ 315
Azores, etc., Islands	..	.....	...	.....	.....	.....	...	.....	512
Belgium	1	$ 1.000	...	.....	40	$ 30,395	36	$ 13,720	12,034
Bulgaria	..	.....	...	.....	.....	.....	...	.....	25
Denmark	..	.....	...	.....	24	20,753	...	.....	338,482
Finland	..	.....	...	.....	1	1,250	...	.....	245
France	..	.....	...	.....	7	19,971	...	.....	41,425
Germany	1	535	...	.....	2	3,081	...	.....	529
Gibraltar	..	.....	...	.....	.....	.....	...	.....	50
Greece	..	.....	...	.....	1	1,200	1	2,500	1,081
Iceland, Faroe Islands	..	.....	...	.....	.....	.....	...	.....	41
Italy	..	.....	...	.....	2	1,100	...	.....	843
Jugoslavia, etc.	..	.....	...	.....	.....	.....	...	.....	242
Malta, etc., Islands	..	.....	...	.....	9	4,523	...	.....	303
Netherlands	56	48,502	4	$ 2.807	30	33,325	1	668	18,391
Norway	..	.....	...	.....	4	4,350	...	.....	8,281
Poland and Danzig	..	.....	...	.....	1	700	4	5,060	5,381
Portugal	..	.....	...	.....	.....	.....	...	.....	1,273
Roumania	2	874	2	668	11	7,368	...	.....	6,360
Spain	..	.....	...	.....	17	25,275	1	1,001	59,272
Sweden	..	.....	...	.....	2	3,900	1	175	5,392
Switzerland	..	.....	...	.....	7	4,203	1	591	4,163
Turkey in Europe	1	715	...	.....	7	3,551	...	.....	5,465
England	17	17,530	36	40,997	43	46,904	176	78,648	494,427
Scotland	..	.....	...	.....	.....	.....	...	.....	3,720
Ireland	..	.....	...	.....	2	1,657	...	.....	11,158
British Honduras	..	.....	...	.....	1	920	...	.....	316
Canada	35	45,973	33	59,820	231	305,906	10	15,526	771,999
Costa Rica	..	.....	...	.....	3	4,500	...	.....	508
Guatemala	..	.....	...	.....	2	2,500	...	.....	1,523
Honduras	2	13,924	...	.....	6	7,950	...	.....	3,512
Nicaragua	..	.....	...	.....	.....	.....	...	.....	643
Panama	6	2,482	...	.....	31	31,843	...	.....	3,694
Salvador	..	.....	...	.....	1	2,439	...	.....	1,432
Mexico	82	35,279	95	35,229	617	364,421	8	1,947	82,763
Newf'dland, Labrador	..	.....	...	.....	.....	.....	...	.....	299
Barbados	..	.....	...	.....	2	1,325	..	.....	1,394
Jamaica	..	.....	2	782	17	12,402	...	.....	5,431
Trinidad and Tobago	..	.....	...	.....	17	10,912	...	.....	8,122
Other Brit. W. Indies	1	400	...	.....	6	3,225	..	.....	2,443
Cuba	13	6,817	1	460	72	71,532	...	.....	31,505
Virgin Islands	..	.....	...	.....	1	350	...	.....	791
Dutch West Indies	..	.....	...	.....	3	1,200	...	.....	450
French West Indies	..	.....	...	.....	1	437	...	.....	627
Haiti	..	.....	...	.....	2	2,300	...	.....	3,238
Dominican Republic	..	.....	1	3,300	6	8,107	...	.....	7,414
Argentina	3	10,600	1	1,164	26	39,256	...	.....	357,083
Bolivia	..	.....	...	.....	.....	.....	...	.....	299
Brazil	..	.....	75	283,750	5	5,900	...	.....	95,312
Chile	1	2,620	...	.....	11	5,512	...	.....	14,082
Colombia	..	.....	...	.....	11	12,902	...	.....	5,747
Ecuador	..	.....	2	3,900	2	7,050	...	.....	326
British Guiana	..	.....	...	.....	3	2,424	...	.....	833
Dutch Guiana	..	.....	...	.....	.....	.....	..	.....	187
Peru	..	.....	...	.....	.....	.....	...	.....	7,809
Uruguay	..	.....	10	2,900	2	3,448	...	.....	2,778
Venezuela	2	11,840	...	.....	16	17,102	...	.....	8,729
Aden	..	.....	...	.....	5	2,890	...	.....	535
China	6	11,738	1	1,643	10	11,317	2	2,550	10,854
Chosen	..	.....	...	.....	1	100	...	.....	.....
Kwatung	8	13,650	...	.....	.....	.....	...	.....	54
British India	1	1,164	...	.....	73	74,601	3	2,700	32,540
Straits Settlements	..	.....	...	.....	.....	.....	...	.....	4,749
Other Brit. E. Indies	..	.....	...	.....	1	976	...	.....	1,531
Dutch East Indies	2	2,393	5	10,142	45	69,826	...	.....	29,938
French Indo China	..	.....	...	.....	.....	.....	...	.....	572
Far Eastern Republic	..	.....	...	.....	.....	.....	...	.....	300
Greece in Asia	..	.....	...	.....	.....	.....	...	.....	154
Hejaz, Arabia, etc.	..	.....	...	.....	.....	.....	...	.....	7,963
Hongkong	..	.....	...	.....	9	35,857	...	.....	2,565
Japan	..	.....	50	25,000	17	15,840	100	49,000	40,454
Palestine and Syria	4	7,701	2	1,150	45	25,789	1	500	6,631
Persia	..	.....	...	.....	.....	.....	...	.....	1,379
Siam	..	.....	...	.....	2	2,500	...	.....	614
Australia	..	.....	19	33,756	83	65,456	191	155,672	31,526
New Zealand	..	.....	2	2,959	16	17,933	...	.....	15,489
Other British Oceania	..	.....	...	.....	.....	.....	...	.....	675
Other Oceania	..	.....	...	.....	7	5,037	...	.....	558
Philippine Islands	..	.....	...	.....	3	2,750	...	.....	11,658
British West Africa	5	4,556	...	.....	1	808	...	.....	2,862
British S. Africa	1	3,000	...	.....	83	96,296	...	.....	32,436
British E. Africa	..	.....	...	.....	16	15,478	...	.....	1,756
Canary Islands	..	.....	...	.....	11	9,977	...	.....	3,773
French Africa	..	.....	...	.....	2	882	...	.....	7,276
Morocco	..	.....	...	.....	.....	.....	2	912	350
Portuguese Africa	1	565	...	.....	2	520	...	.....	1,086
Egypt	3	1,311	...	.....	54	27,269	...	.....	11,025
Totals	**254**	**$244,669**	**341**	**$510,427**	**1,791**	**$1,621,471**	**538**	**$331,170**	**$2,703,002**

'Bus Market in Italy

A new motor 'bus line has been started recently between Bagni di Casciana (Pisa Province), Casciana Alta, Fauglia Stazione, Nugola, and Leghorn, Italy, by the firm Witta CESA (Corse Economiche Servizi Automobilistici) represented at Bagni di Casciana by Messrs. Carpita and Sgherri. It is understood that Italian cars will be used, but it is suggested that American manufacturers interested in the possibilities for sale of equipment write to the above firm, addressing: Ditta CESA, Bagni di Casciana, Pisa Province, Italy.

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The State of Transport Legislation

A Survey of Existing Laws Shows Great Handicaps Under Which Motor Haulage Is Placed by Restricted Viewpoint of State Lawmakers Who Regulate Traffic

IN THE following paragraphs the laws now in effect in the various states are summarized with respect to their principal provisions affecting truck and trailer use. First under each state are given the regulations covering truck operation, showing (1) Fees for annual registration, (2) Weight restrictions, (3) Size limits, (4) Speed limits, (5) Gasolene tax, (6) General tax, and, secondly the rules governing trailer use, showing (1) Fees for annual registration, (2) Number of trailers allowed in a train. In all cases the provisions given are in effect as of January 1, 1922, either through the passage of new regulations made effective on that date or through the continued operation of laws previously enacted.

ALABAMA.

Trucks—

Fees: 1-ton capacity and less.....$15.00
1- to 2-ton capacity..... 22.50
2- to 3-ton capacity..... 37.50
3- to 4-ton capacity..... 56.25
Over 4-ton capacity..... 75.00
Weight: No limits.
Size: No limits.
Speed: 30 miles an hour.
Gasolene tax: None.
General tax: Registration fee is in lieu of all taxes.

Trailers—No law.

ARIZONA.

Trucks—

Fees: 1½-ton capacity and less....$10.00
1½- to 3-ton capacity 15.00
Over 3-ton capacity 25.00
Weight: No limits.
Size: No limits.
Speed: In cities, 10 to 15 miles an hour. In country, 30 miles an hour.
Gasolene tax: 1 cent a gallon.
General tax: Personal property.

Trailers—No law.

ARKANSAS.

Trucks—

Fees: 1 -ton capacity and less....$15.00
1 - to 1½-ton capacity..... 20.00
1½- to 2 -ton capacity..... 25.00
2 - to 2½-ton capacity..... 35.00
2½- to 3 -ton capacity..... 50.00
3 - to 3½-ton capacity..... 60.00
3½- to 4 -ton capacity..... 80.00
4 - to 4½-ton capacity.....100.00
4½- to 5 -ton capacity.....125.00
5 - to 6 -ton capacity.....150.00
Weight: Maximum capacity 6 tons.
Size: No limits.
Speed: No limits.
Gasolene tax: 1 cent a gallon.
General tax: Personal property.

Trailers—

Fees: (On pneumatic tires; no schedule for solid tires):
1-ton capacity and less $10.00
1- to 2-ton capacity..... 15.00
2- to 3-ton capacity..... 25.00
3- to 4-ton capacity..... 40.00
4- to 5-ton capacity..... 50.00
Number: No limits.

CALIFORNIA.

Trucks—

Fees: 2-ton unladen weight and less.$ 5.00*
2- to 3-ton unladen weight.. 10.00*
3- to 5-ton unladen weight.. 15.00*
5-ton unladen wt. and over.. 20.00*
*Plus 40 cents a horse-power.
Weight: 700 pounds per inch width of tire base. Tires must be at least 1 inch thick.
Size: Outside width of track, 112 inches. Outside width of bed of vehicle and load, 102 inches.
Speed: No limits.
Gasolene tax: None.
General tax: Personal property.

Trailers—

Fees: $2.00 per trailer.
Number: 2.

COLORADO.

Trucks—

Fees: 1-ton capacity $10.00
1- to 2-ton capacity..... 17.50
2- to 3-ton capacity..... 25.00
3- to 4-ton capacity..... 37.50
4- to 5-ton capacity..... 50.00
For each additional ton over 5 25.00
Weight: Gross weight on 4 wheels, 10 tons.
Size: Width in prairie districts, 12 feet. Width elsewhere, 9 feet.
Speed: General .....35 miles an hour
Mountain highways .....20 miles an hour
Curves .....18 miles an hour
Vehicles weighing over 3 tons gross.15 miles an hour
Gasolene tax: 1 cent a gallon.
General tax: Personal property.

Trailers—No law.

CONNECTICUT.

Trucks—

Fees: 1-ton capacity and less.....$ 30.00
2-ton capacity 40.00
3-ton capacity 50.00
3½- to 4 -ton capacity.... 137.50
4 - to 4½-ton capacity.... 162.50
4½- to 5 -ton capacity.... 187.50
5 - to 5½-ton capacity.... 218.75
5½- to 6 -ton capacity.... 250.00
Over 6-ton capacity, $250.00, plus $100.00 for each additional ton.
Weight: Gross weight, 25,000 pounds.
Size: Over-all width, 114 inches.
Speed: No limits.
Gasolene tax: 1 cent a gallon.
General tax: Personal property.

Trailers—No law.

DELAWARE.

Trucks—

Fees: $2.00 per 500 pounds of gross weight.
Weight: Maximum gross weight, 26,000 pounds, 700 pounds per inch of tire width.
Size: Width, 96 inches.
Length, 146 inches.
Speed: In cities, 15 miles an hour.
In country, 30 miles an hour.
Gasolene tax: None.
General tax: Registration fee is in lieu of all taxes.

Trailers—

Fees: $2.00 per 500 pounds of gross weight. $4.00 per 500 pounds of gross weight, if vehicle is on metal tires and gross weight exceeds 1,500 pounds.
Number: No limits.

FLORIDA.

Trucks—

Fees: On pneumatic tires, 75 cents a 100 pounds gross weight.
On solid tires, $1.12 a 100 pounds gross weight.
Weight: On country roads with pneumatic tires, 16,000 pounds.
On country roads with solid tires, 8,000 pounds.
Size: Width, 84 inches.
Height, 144 inches.
Speed: General .....30 miles an hour
On bridges and turns .....15 miles an hour
Passing street-railway cars.. 5 miles an hour
Gross weight 5 tons or more..10 miles an hour
Gasolene tax: 1 cent a gallon.
General tax: Personal property.

Trailers—

Fees: On pneumatic tires, 75 cents a 100 pounds gross weight.
On solid tires, $1.12 a 100 pounds gross weight.
Number: No limits.

GEORGIA.

Trucks—

Fees: 1-ton capacity and less....$ 15.00
1½- to 2 -ton capacity... 22.50
2 - to 2½-ton capacity... 30.00
2½- to 3 -ton capacity... 37.50
3 - to 3½-ton capacity... 45.00
3½- to 4 -ton capacity... 75.00
4 - to 5 -ton capacity... 150.00
5 - to 6 -ton capacity... 375.00
6 - to 7 -ton capacity... 750.00
Over 7-ton capacity 1,125.00
Weight: No limits.
Size: No limits.
Speed: 30 miles an hour.
Gasolene tax: 1 cent a gallon.
General tax: Personal property.

Trailers—No law.

IDAHO.

Trucks—

Fees: 1-ton gross weight and less..$15.00
1 - to 1½-ton gross weight.. 20.00
1½- to 2 -ton gross weight.. 30.00
Over 2-ton gross weight..... 40.00
Weight: No vehicle to be loaded in excess of 50 per cent. above the manufacturer's rated capacity.
Size: Width, 96 inches.
Speed: 30 miles an hour.
Gasolene tax: None.
General tax: Registration fee is in lieu of all taxes.

Trailers—

Fees: Same as for trucks.
Number: No limits.

ILLINOIS.

Trucks—

Fees: 2½-ton gross weight and less.$12.00
2½- to 6 -ton gross weight.. 22.50
6 - to 7½-ton gross weight.. 35.00
Over 7½-ton gross weight.... 60.00
Weight: In country, 800 pounds per inch of tire width, 16,000 pounds per axle.
In cities of 20,000 population and more, 1,200 pounds per inch of tire width, 24,000 pounds per axle.
Size: Width, 96 inches.
Length of trailer combination, 65 feet.
Speed: On pneumatic tires
2½-ton gross weight .....25 miles an hour
2½- to 6-ton gross weight..20 miles an hour
6- to 7½-ton gross weight.15 miles an hour
Over 7½-ton gross weight .....12 miles an hour
On solid tires—
2½-ton gross weight .....20 miles an hour
2½- to 6-ton gross weight.15 miles an hour
6- to 7½-ton gross weight..12 miles an hour
Gasolene tax: None.
General tax: Personal property.

Trailers—No law.

INDIANA.

Trucks—

Fees: Less than 1-ton capacity...$ 6.00
1 - to 2 -ton capacity..... 15.00
2 - to 3½-ton capacity..... 25.00
3½- to 5 -ton capacity..... 50.00
5 - to 7½-ton capacity..... 75.00
Weight: 7½-ton capacity.
Size: No limits.
Speed: In cities, 10 to 15 miles an hour. In country, 25 miles an hour.
Gasolene tax: None.
General tax: Personal property.

Trailers—

Fees: Less than 1-ton capacity....$ 3.00
1- to 2 -ton capacity..... 6.00
2- to 5 -ton capacity..... 10.00
5- to 7½-ton capacity..... 20.00
Number: No limits.

IOWA.

Trucks—

	Pneumatic.	Solid.
Fees: 1-ton capacity and less	$15.00	$15.00
1½-ton capacity	22.50	22.50
2 -ton capacity	30.00	30.00
2½-ton capacity	45.00	55.00
3 -ton capacity	65.00	75.00
3½-ton capacity	90.00	100.00
4 -ton capacity 105.00		115.00
4½-ton capacity 120.00		130.00
5 -ton capacity 135.00		145.00
6 -ton capacity 165.00		175.00
For each additional ton over 6		50.00

Weight: On pneumatic tires, 00 pounds per inch of tire width.
On solid tires, 500 pounds per inch of tire width.
Size: No limits.
Speed: On pneumatic tires—
Less than 3-ton gross weight..30 miles an hour
3- to 6-ton gross weight .....25 miles an hour
6-ton gross weight .....16 miles an hour

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On solid tires—
Less than 3-ton gross weight..25 miles an hour
3- to 6-ton gross weight .....20 miles an hour
6-ton gross weight .....12 miles an hour
On metal tires..10 miles an hour
Gasolene tax: None.
General tax: Registration fee is in lieu of all taxes.

Trailers—

Fees: Capacity.	Pneumatic.	Two or More Solid.	Metal.
Less than ½-ton	....	....	....
½- to 1-ton	$10.00	....	$15.00
1- to 2-ton	15.00	$ 5.00	30.00
2- to 3-ton	....	15.00	....
3- to 4-ton	25.00	35.00	....
4- to 5-ton	40.00	50.00	....
5- to 6-ton	50.00	60.00	....
6- to 7-ton	60.00	70.00	....

Number: No limits.

KANSAS.

Trucks—
Fees: 1-ton capacity and less $15.00
1 - to 1½-ton capacity..... 22.50
1½- to 2 -ton capacity..... 30.00
2 - to 2½-ton capacity..... 37.50
2½- to 3 -ton capacity..... 45.00
3 - to 4 -ton capacity..... 70.00
4 - to 5 -ton capacity.....100.00
5 -ton capacity 100.00
For each additional ton or fraction 25.00
Weight: No limits.
Size: No limits.
Speed: No limits.
Gasolene tax: None.
General tax: Personal property.
Trailers—No law.

KENTUCKY.

Trucks—
Fees: ½-ton capacity and less....$ 22.00
½- to 1 -ton capacity..... 30.00
1 - to 1½-ton capacity..... 40.00
1½- to 2 -ton capacity..... 50.00
2 - to 2½-ton capacity..... 60.00
2½- to 3 -ton capacity..... 70.00
3 - to 3½-ton capacity..... 90.00
3½- to 4 -ton capacity..... 110.00
4 - to 4½-ton capacity..... 130.00
4½- to 5 -ton capacity..... 150.00
Over 5-ton capacity, $150.00, plus $50.00 for each additional ton.
Weight: On rubber tires, 800 pounds per inch of tire width.
On metal tires, 500 pounds per inch of tire width.
Size: No limits.

Speed: In cities.	Miles an Hour. Rubber.
1-ton capacity	10 to 15
1- to 2¾-ton capacity.	7 to 14
2¾-ton capacity	7 to 11
	Metal.
1-ton capacity	6 to 8
1- to 2¾-ton capacity.	6 to 8
2¾-ton capacity	6 to 8
In country—	Rubber.
1-ton capacity	25
1- to 2¾-ton capacity...	20
2¾-ton capacity	15
	Metal.
1-ton capacity	10
1- to 2¾-ton capacity..	10
2¾-ton capacity	10

Gasolene tax: 1 cent a gallon.
General tax: Personal property.
Trailers—No law.

LOUISIANA.

Trucks—
Fees: Flat rate of $7.50.
Weight: No limits.
Size: No limits.
Speed: No limits.
Gasolene tax: None.
General tax: Personal property.
Trailers—No law.

MAINE.

Trucks—
Fees: (On pneumatic tires)—
½-ton capacity and less.....$ 10.00
½- to 1-ton capacity..... 15.00
1- to 2-ton capacity..... 20.00
2- to 3-ton capacity..... 55.00
3- to 4-ton capacity..... 80.00
Over 4-ton capacity 110.00
On 2 or more solid tires, 33⅓ per cent additional.
Weight: 18,000 pounds gross weight on 4 wheels, 27,000 pounds gross weight on 6 wheels, 700 pounds per inch of tire width.
Size: Width, 96 inches.
Height, 150 inches.
Speed: 4- to 6-ton gross weight, 15 miles an hour.
Over 6-ton gross weight, 6 miles an hour.
Gasolene tax: None.
General tax: Personal property.

Trailers—
Fees: On pneumatic tires, 15 cents a 100 pounds gross weight.
On solid tires, 40 cents a 100 pounds gross weight.
On metal tires, 75 cents a 100 pounds gross weight.
Number: No limits.

MARYLAND.

Trucks—
Fees: On pneumatic tires, 60 cents a horse-power (minimum, $10.00).
On solid tires—
1-ton capacity and less ..$ 20.00
1- to 2-ton capacity..... 40.00
2- to 3-ton capacity..... 60.00
3- to 4-ton capacity..... 100.00
4- to 5-ton capacity..... 150.00
5- to 6-ton capacity..... 300.00
6- to 7-ton capacity..... 500.00
Electrics on solid tires charged at one-half the solid-tire rates.
Weight: Maximum gross weight, 10 tons, 650 pounds per inch of tire width.
Size: Width, 90 inches.
Speed: On solid tires—
2-ton capacity and less .....25 miles an hour
2- to 6-ton capacity .....15 miles an hour
Over 6-ton capacity .....12 miles an hour
On pneumatic tires—
In cities ..15 to 20 miles an hour
In country ....35 miles an hour
Over 3-ton capacity .....25 miles an hour
On metal tires..... 6 miles an hour
Gasolene tax: None.
General tax: Personal property.

Trailers—
Fees: On rubber tires, $10.00 for 1-ton capacity and $20.00 extra for each additional ton of capacity.
On metal tires double the above rates.
Number: No limits.

MASSACHUSETTS.

Trucks—
Fees: 1-ton capacity and less.....$10.00
1- to 2-ton capacity..... 20.00
For each additional ton..... 10.00
Electric trucks charged for at one-half the above rates.
Weight: Maximum gross weight, 14 tons, 800 pounds per in. of tire width.
Size: Width, 96 inches.
Length, 28 feet.
Length of trailer combination, 65 feet.
Speed: In cities .....15 miles an hour
In country .....20 miles an hour
Over 4-ton gross weight .....15 miles an hour
On metal tires.... 4 miles an hour
Gasolene tax: None.
General tax: Personal property.

Trailers—
Fees: On pneumatic tires, one-half of truck rates.
On solid tires, same as truck rates.
On metal tires, double truck rates.
Number: No limits.

MICHIGAN.

Trucks—
Fees: Gas trucks 25 cents a horse-power, plus 35 cents a 100 pounds of unladen weight.
Electric trucks, $1.00 a horse-power, plus 35 cents a 100 pounds of gross unladen weight.

Weight:	Per Wheel.
2 -inch tire	700 pounds
2½-inch tire	900 pounds
3 -inch tire	1,200 pounds
3½-inch tire	1,600 pounds
4 -inch tire	1,900 pounds
5 -inch tire	2,200 pounds
6 -inch tire	2,700 pounds
7 -inch tire	3,200 pounds

Maximum gross weight, 15 tons.
Size: Width, 96 inches.
Height, 150 inches.
Length of trailer combination, 60 feet.
Speed: 2 to 10 miles an hour, varying with load.
Gasolene tax: None.
General tax: Personal property.

Trailers—
Fees: 50 cents a 100 pounds of unladen weight.
Number: 2.

MINNESOTA.

Trucks—
Fees: Minimum fee 2 per cent. of value, plus:
Less than 2-ton capacity.....$15.00
2- to 4-ton capacity 30.00
Over 4-ton capacity 50.00
Trucks used solely for road and agricultural work not subject to fees.
Weight: Maximum gross weight, 14 tons, 22,400 pounds per axle, 800 pounds per inch of tire width.
Size: Width, 96 inches.
Height, 150 inches.
Length, 30 feet.
Length of trailer combination, 85 feet.
Speed: No limits.
Gasolene tax: None.
General tax: Personal property.

Trailers—
Fees: Minimum fee 2 per cent. of value, plus:
Minimum fee for 1-ton or less capacity, $10.00.
Each additional ton or fraction, $2.00.
Number: No limits.

MISSISSIPPI.

Trucks—
Fees: Less than 1-ton capacity..$ 10.00
1 - to 1½-ton capacity..... 15.00
2 -ton capacity 30.00
2½-ton capacity 35.00
3 -ton capacity 55.00
3½-ton capacity 75.00
4 -ton capacity 115.00
4½-ton capacity 155.00
5 -ton capacity 200.00
6 -ton capacity 250.00
Over 6-ton capacity 300.00
Weight: No limits.
Size: No limits.
Speed: In cities .....15 miles an hour
In country .....30 miles an hour
Gasolene tax: None.
General tax: Personal property.
Trailers—No law.

MISSOURI.

Trucks—
Fees: 2 horse-power and less .....$ 2.00
2 to 11 horse-power..... 4.00
12 to 23 horse-power..... 6.00
24 to 35 horse-power..... 10.00
36 to 47 horse-power..... 14.00
48 to 59 horse-power..... 16.00
67 to 71 horse-power..... 20.00
72 horse-power and over 24.00
Weight: No limits.
Size: No limits.
Speed: 25 miles an hour.
Gasolene tax: None.
General tax: Personal property.
Trailers—No law.

MONTANA.

Trucks—
Fees: 1-ton capacity and less.....$10.00
1- to 2-ton capacity..... 22.50
2- to 3-ton capacity..... 37.50
Over 3-ton capacity 60.00
Weight: No limits.
Size: No limits.
Speed: In cities .....15 miles an hour
In country .....25 miles an hour
Gasolene tax: 1 cent a gallon.
General tax: Personal property.
Trailers—No law.

NEBRASKA.

Trucks—
Fees: 1-ton gross weight $10.00
For each additional 100 pounds .50
Weight: 9,000 pounds per wheel, 600 pounds per inch of tire width.
Size: Width, 90 inches.
Height, 144 inches.
Speed: 35 miles an hour.
Gasolene tax: None.
General tax: Personal property.
Trailers—No law.

NEVADA.

Trucks—
Fees: 35 cents a 100 pounds gross weight.
Weight: Gross weight, 10 tons, 400 pounds per inch of tire width.
Size: No limits.
Speed: Maximum, 25 miles an hour; otherwise reasonable, varying with gross weight and kind of tire used.
Gasolene tax: None.
General tax: Personal property.

Trailers—
Fees: Same as for trucks.
Number: No limits.

NEW HAMPSHIRE.

Trucks—
Fees: On pneumatic tires, 60 cents a 100 pounds gross weight (minimum $20.00).
On solid tires, 85 cents a 100 pounds gross weight (minimum $30.00).
On metal tires, $1.00 a 100 pounds gross weight.
Weight: Maximum gross weight, 20,000 pounds, 15,000 pounds per axle, 750 pounds per inch of tire width.
Size: Width, 96 inches.
Length, 30 feet.
Length of trailer combination, 85 feet.
Weight: No limits.
Gasolene tax: None.
General tax: None.

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Trailers—
Fees: On pneumatic tires, 60 cents a 100 pounds gross weight.
On solid tires, 85 cents a 100 pounds gross weight.
On metal tires, $1.00 a 100 pounds gross weight.
Number: No limits.

NEW JERSEY.

Trucks—
Fees: ½-ton gross weight and less..$10.00
½- to 1 -ton gross weight.. 12.00
1 - to 1½-ton gross weight.. 15.00
1½- to 2 -ton gross weight.. 20.00
2 - to 2½-ton gross weight.. 24.00
2½- to 3 -ton gross weight.. 27.00
3 - to 3½-ton gross weight.. 30.00
3½- to 4 -ton gross weight.. 33.00
4 - to 4½-ton gross weight.. 36.00
4½- to 5 -ton gross weight.. 38.00
5 - to 5½-ton gross weight.. 40.00
5½- to 6 -ton gross weight.. 42.00
For each additional half-ton.. 2.00
For ownership by corporation outside the state, $100.00 extra.
Weight: Maximum gross weight, 25,000 pounds (unless permit for 30,000 is obtained), 800 pounds per inch of tire width, measured at widest part of tire.
Size: Width, 96 inches.
Length, 28 feet.
Height, 150 inches.
Speed: 4- to 6-ton gross weight .....16 miles an hour
6- to 8-ton gross weight .....14 miles an hour
8- to 15-ton gross weight .....10 miles an hour
Gasolene tax: None.
General tax: Personal property.
Trailers—
Fees: Same as for trucks.
Number: 1.

NEW MEXICO.

Trucks—
Fees: On pneumatic tires—
$12.00, plus 40 cents a 100 pounds of rated load capacity over 1½ ton.
On solid tires—
25 per cent. additional.
Weight: Rim of tire must be 3 inches or more in width, if capacity exceeds 2,000 pounds. Unreasonable use of the highways forbidden.
Size: Width 96 inches.
Speed: In cities .....15 miles an hour
In country .....30 miles an hour
At railroad crossings. ..... 6 miles an hour
Gasolene tax: 1 cent a gallon.
General tax: Personal property.
Trailers—
Fees: On rubber tires, 25 cents a 100 pounds of rated capacity.
On metal tires, 50 cents a 100 pounds of rated capacity.
Number: No limits.

NEW YORK.

Trucks—
Fees: 2-ton gross weight and less..$10.00
2- to 3-ton gross weight.... 15.00
3- to 4-ton gross weight.... 20.00
4- to 5-ton gross weight.... 25.00
5- to 6-ton gross weight.... 30.00
6- to 7-ton gross weight.... 35.00
7- to 8-ton gross weight.... 40.00
8- to 9-ton gross weight.... 45.00
9- to 10-ton gross weight.... 50.00
10- to 11-ton gross weight.... 55.00
11- to 12-ton gross weight.... 60.00
12- to 13-ton gross weight.... 65.00
13- to 14-ton gross weight.... 70.00
Over 14-ton gross weight..... 70.00
Plus $10.00 for each additional ton.
Weight: Maximum gross weight, 25,000 pounds, 800 pounds per inch of tire width measured at the base of the channel or between the flanges and the rim.
Size: Width, 96 inches.
Height, 150 inches.
Racks may be 96 inches wide at bottom and 144 inches at top.
Speed: 30 miles an hour.
Gasolene tax: None.
General tax: None.
Trailers—
Fees: 2-ton gross weight and less.$ 5.00
2- to 5-ton gross weight.... 10.00
5- to 7-ton gross weight.... 15.00
7- to 10-ton gross weight.... 20.00
10- to 14-ton gross weight.... 30.00
For each additional ton..... 5.00
Number: No limits.

NORTH CAROLINA.

Trucks—
Fees: Less than ½-ton capacity....$ 12.50
½- to 1-ton capacity..... 15.00
1- to 2-ton capacity..... 25.00
2- to 3-ton capacity..... 75.00
3- to 4-ton capacity..... 200.00
4-ton capacity and over.... 300.00
Weight: No limits.
Size: No limits.
Speed: No limits.
Gasolene tax: 1 cent a gallon.
General tax: Personal property.
Trailers—
Fees: $15.00 per ton of capacity.
Number: No limits.

NORTH DAKOTA.

Trucks—
Fees: First year, ½ cent per dollar of list price, plus 20 cents a 100 pounds of weight, plus 10 cents per horsepower, plus the following:
Less than 3-ton capacity...$ 3.00
3- to 4-ton capacity..... 5.00
Over 4-ton capacity 10.00
Second year, 10 per cent. less than above fees.
Third year, 25 per cent less than above fees.
Thereafter 40 per cent. less than above fees.
Weight: No limits.
Size: No limits.
Speed: In cities .....10 miles an hour
In country .....30 miles an hour
Gasolene tax: None.
General tax: Registration is in lieu of all taxes.
Trailers—No law.

OHIO.

Trucks—
Fees: 20 cents a 100 pounds of gross weight, plus the following:
25 horse-power and less..$ 8.00
26 to 35 horse-power..... 12.00
Over 35 horse-power 20.00
Electrics 8.00
Weight: Maximum gross weight 10 tons, 14,000 pounds per axle, 600 pounds per inch of tire width on rubber, 500 pounds per inch of tire on metal (3-inch), 35 per cent. of gross weight on one wheel.
Size: Width, 96 inches.
Height, 150 inches.
Length, 30 feet.
Length of trailer combination, 85 feet.
Speed: On pneumatic tires—
Less than 5-ton gross weight.25 miles an hour
5- to 8-ton gross weight .....20 miles an hour
8- to 10-ton gross weight. 15 miles an hour
On solid tires—
Less than 5-ton gross weight.20 miles an hour
5- to 8-ton gross weight .....15 miles an hour
8- to 10-ton gross weight.12 miles an hour
Gasolene tax: None.
General tax: Personal property.
Trailers—
Fees: 20 cents a 100 pounds gross weight.
Number: No limits.

OKLAHOMA.

Trucks—
Fees: ¾-ton capacity and less....$ 15.00
¾- to 1 -ton capacity.... 20.00
1 - to 1½-ton capacity.... 25.00
1½- to 2 -ton capacity.... 40.00
2 - to 3 -ton capacity.... 60.00
3 - to 4 -ton capacity.... 100.00
4 -ton capacity and over.... 300.00
Each year during the first three years these rates will be reduced 20 per cent., except for trucks of 5-ton or more capacity; the minimum charge is $10.00.
Weight: No limits.
Size: No limits.
Speed: No limits.
Gasolene tax: None.
General tax: Registration fee is in lieu of all taxes.
Trailers—No law.

OREGON.

Trucks—
Fees: On pneumatic tires—
20 inches* and less .....$ 35.00
21 to 24 inches*..... 42.00
25 to 26 inches*..... 49.00
29 to 32 inches*..... 56.00
33 to 40 inches*..... 70.00
On solid tires—
14 inches* and less 35.00
15 to 17 inches*..... 42.00
18 to 22 inches*..... 55.00
23 to 26 inches*..... 65.00
27 to 30 inches*..... 105.00
31 to 36 inches*..... 126.00
37 to 40 inches*..... 140.00
*Of total tire width on one wheel.
Weight: On rubber tires—
Maximum gross weight, 22,000 pounds, 17,600 pounds per axle, 500 pounds per inch of tire width, 600 pounds for 30 inches of tire width of all wheels.
On metal tires, 6,500 pounds on hard-surfaced roads.
Size: Width, 96 inches.
Speed: On pneumatic tires—
6,000 pounds gross weight and less ....30 miles an hour
6,000 to 12,000 pounds gross weight .....25 miles an hour
12,000 to 16,000 pounds gross weight .....22 miles an hour
16,000 to 19,000 pounds gross weight .....20 miles an hour
19,000 to 22,000 pounds gross weight .....18 miles an hour
On solid tires—
6,000 pounds gross weight and less ....25 miles an hour
6,000 to 12,000 pounds gross weight .....20 miles an hour
12,000 to 16,000 pounds gross weight .....18 miles an hour
16,000 to 19,000 pounds gross weight .....15 miles an hour
19,000 to 22,000 pounds gross weight .....12 miles an hour
On metal tires .. 8 miles an hour
Gasolene tax: 2 cents a gallon.
General tax: None.
Trailers—
Fees: One-half of truck rates.
Number: No limits.

PENNSYLVANIA.

Trucks—

Fees: Chassis Weight.	Pneumatic.	Solid.
1 - to 1½-ton.....	$ 24.00	$ 30.00
1½- to 2 -ton.....	32.00	40.00
2 - to 2½-ton.....	40.00	50.00
2½- to 3 -ton.....	56.00	70.00
3 - to 3¾-ton.....	80.00	100.00
3¾- to 4½-ton.....	100.00	125.00
4½-ton and over....	140.00	200.00

Electrics with solid or pneumatic tires placed in pneumatic-tire class.
Weight: Maximum gross weight 26,000 pounds, 19,500 pounds per axle, 800 pounds per inch of tire width.
Size: Width, 96 inches.
Length, 28 feet.
Speed: 10 to 26 miles an hour, varying with weight of chassis and whether solid or pneumatic tires are used.
Gasolene tax: 1 cent a gallon.
General tax: None.
Trailers—
Fees: Less than 500 pounds gross weight free.
On rubber tires same as truck fees.
On metal tires double truck fees.
Number: No limits.

RHODE ISLAND.

Trucks—
Fees: 25 cents a horse-power, plus the following:
On pneumatic tires, 25 cents a 100 pounds gross weight.
On solid tires, 35 cents a 100 pounds gross weight.
On metal tires, 50 cents a 100 pounds gross weight.
Weight: No limits.
Size: No limits.
Speed: No limits.
Gasolene tax: None.
General tax: Personal property.
Trailers—
Fees: On pneumatic tires, 15 cents a 100 pounds gross weight.
On solid tires, 25 cents a 100 pounds gross weight.
On metal tires, 35 cents a 100 pounds gross weight.
Number: No limits.

SOUTH CAROLINA.

Trucks—
Fees: 1-ton capacity and less.....$ 15.00
1- to 2-ton capacity..... 30.00
2- to 3-ton capacity..... 60.00
3- to 4-ton capacity..... 100.00
4- to 5-ton capacity..... 200.00
5- to 6-ton capacity..... 250.00
6-ton capacity and over..... 350.00
Less 25 per cent., if on pneumatic tires.
Weight: 4-ton capacity unless by special permit.
Size: Width, 90 inches.
Speed: No limits.
Gasolene tax: None.
General tax: Personal property.
Trailers—
Fees: $5.00 per trailer, plus $2.00 per ½ ton of capacity.
Number: No limits.

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SOUTH DAKOTA.

Trucks—
Fees: Less than 1-ton capacity....$15.00
1 - to 1½-ton capacity..... 20.00
1½- to 2 -ton capacity..... 25.00
2 - to 3 -ton capacity..... 35.00
3 -ton capacity and over.... 75.00
Weight: No limits.
Size: No limits.
Speed: No limits.
Gasolene tax: 1 cent a gallon.
General tax: Personal property.

Trailers—
Fees: Same as for trucks.
Number: No limits.

TENNESSEE.

Trucks—
Fees: 50 cents a horse-power, plus $5.00 per ton capacity.
Electrics $25.00, plus $5.00 per ton capacity.
Weight: 3-ton capacity in counties having population between 21,491 and 21,485.
Size: No limits.
Speed: No limits.
Gasolene tax: None.
General tax: None.

Trailers—No law.

TEXAS.

Trucks—
Fees: 1- to 2-ton capacity.....$ 30.00
2- to 3-ton capacity..... 50 00
3- to 4-ton capacity..... 80.00
4- to 5-ton capacity..... 120.00
Weight: Maximum gross weight, 5,000 pounds per wheel, 500 pounds per inch of tire width.
Size: Width, 84 inches.
Speed: On pneumatic tires—
2-ton gross weight .....15 miles an hour
3-ton gross weight .....12 miles an hour
4-ton gross weight and over. .....10 miles an hour
On solid tires—
2-ton gross weight .....14 miles an hour
Over 2-ton gross weight .....10 miles an hour
Gasolene tax: None.
General tax: Personal property.

Trailers—
Fees: On pneumatic tires, 15 cents a 100 pounds gross weight.
On solid tires, 25 cents a 100 pounds gross weight.
On metal tires, 35 cents a 100 pounds gross weight.
Number: No limits.

UTAH.

Trucks—

	Pneumatic.	Two or More Solid.	Metal.
Fees: 1 -ton capacity.	$20.00	$27.50	$40.00
1½-ton capacity.	25.00	35.00	60.00
2 -ton capacity.	30.00	45.00	80.00
2½-ton capacity.	35.00	55.00	.....
3 -ton capacity.	45.00	65.00	.....
3½-ton capacity.	55.00	80.00	.....
4 -ton capacity.	65.00	100.00	.....
4½-ton capacity.	75.00	120.00	.....
5 -ton capacity.	90.00	140.00	.....

On special permit truck over 5-ton capacity is charged an additional $50.00 per ton.
Weight: Maximum gross weight 11 tons, 3¾ tons per wheel, 600 pounds per inch of tire width on pavements, 400 pounds per inch of tire width on dirt or gravel.
Size: Width, 96 inches.
Speed: On pneumatic tires—
Less than 3-ton gross weight.30 miles an hour
3- to 4-ton gross weight .....25 miles an hour
Over 4-ton gross weight .....16 miles an hour
On 2 or more solid tires—
Less than 3-ton weight .....20 miles an hour
3- to 4-ton gross weight .....15 miles an hour
Over 4-ton gross weight ..... 8 miles an hour
On metal tires.... 5 miles an hour
Gasolene tax: None.
General tax: Personal property.

Trailers—

Fees:	Pneumatic.	Solid.	Metal.
½-ton capacity.	....	....	$15.00
1-ton capacity.	$10.00	$15 00	25.00
2-ton capacity.	15.00	25.00	50.00
3-ton capacity.	25.00	40 00	....
4-ton capacity.	40.00	60.00	....
5-ton capacity.	50.00	75.00	....

Number: No limits.

VERMONT.

Trucks—
Fees: ¾- to 1 -ton capacity.....$ 20.00
1 - to 1½-ton capacity..... 30.00
1½- to 2 -ton capacity..... 40.00
2 - to 2½-ton capacity..... 50.00
2½- to 3 -ton capacity..... 75.00
3 - to 4 -ton capacity..... 100 00
For each additional ton..... 25.00
Weight: Maximum gross weight, 6¼ tons, 600 pounds per inch of tire width.
Size: Width, 96 inches.
Height, 146 inches.
Speed: 4-ton capacity....15 miles an hour
6-ton capacity....12 miles an hour
Gasolene tax: None.
General tax: Registration fee is in lieu of all taxes.

Trailers—No law.

VIRGINIA.

Trucks—
Fees: 1-ton capacity $15.00
For each additional ½ ton.. 5.00
Weight: Maximum gross weight, 24,000 pounds, 700 pounds per inch of tire width.
Size: No limits.
Speed: In cities .....10 miles an hour
In country .....20 miles an hour
Gasolene tax: None.
General tax: Personal property.

Trailers—
Fees: 1-ton capacity $15.00
For each additional ½ ton.. 3.00
Number: No limits.

WASHINGTON.

Trucks—
Fees: Weight up to 6,500 pounds, $10.00, plus 40 cents a 100 pounds over 1,500 pounds, plus 40 cents a 100 pounds of rated capacity.
Weight over 6,500 pounds, $10.00, plus 50 cents a 100 pounds over 1,500 pounds, plus 50 cents a 100 pounds of rated capacity.
Weight: Maximum gross weight, 24,000 pounds, 22,400 pounds per axle, 800 pounds per inch of tire width.
Size: No limits.
Speed: On pneumatic tires,25 miles an hour
On solid tires—
Capacity:
2- to 4-ton...20 miles an hour
4- to 6-ton...18 miles an hour
6- to 8-ton...16 miles an hour
8- to 10-ton...14 miles an hour
10- to 12-ton...12 miles an hour
Gasolene tax: 1 cent a gallon.
General tax: Personal property.

Trailers—
Fees: Same as for trucks.
Number: No limits.

WEST VIRGINIA.

Trucks—
Fees: On pneumatic tires, 30 cents a horse-power, plus 30 cents a 100 pounds gross weight.
On solid tires—
1-ton capacity .....$ 25.00
2-ton capacity 50.00
3-ton capacity 100.00
4-ton capacity 200.00
5-ton capacity 400.00
Weight: Maximum gross weight, 22,000 pounds, 17,000 pounds per axle, 9,000 pounds per wheel, 600 pounds per inch of tire width.
Size: Width, 90 inches.
Speed: No limits.
Gasolene tax: None.
General tax: Personal property.

Trailers—

Fees:	Pneumatic.	Solid.
1-ton capacity and less.	$5.00	$10.00
Each additional ton.....	7.50	15.00

Number: No limits.

WISCONSIN.

Trucks—
Fees: Less than 2,100-pound capacity.$15.00
2,100- to 5,099-pound capacity 20.00
5,100-pound capacity or more 25.00
Weight: Maximum gross weight, 24,000 pounds, 18,000 pounds per axle, 800 pounds per inch of tire width.
Size: Width, 96 inches.
Length, 30 feet.
Speed: No limits.
Gasoline tax: None.
General tax: Personal property.

Trailers—No law.

WYOMING.

Trucks—
Fees: 1-ton capacity and less.....$ 15.00
1- to 2-ton capacity..... 30.00
2- to 3-ton capacity..... 50 00
3- to 4-ton capacity..... 75.00
4- to 5-ton capacity..... 100.00
Over 5-ton capacity..... 150.00
Weight: Maximum gross weight 25,000 pounds.
Size: No limits.
Speed: No limits.
Gasolene tax: None.
General tax: Personal property.

Trailers—
Fees: Same as for trucks; no charge for trailers of less than 500-pound capacity.
Number: No limits.

Says Trucks Damage Roads

A severe indictment of heavy trucks for responsibility in the destruction of our highways is contained in an article by Harold G. McGee, consulting engineer for the Akron Bureau of Municipal Research, in *Finance and Industry*. He contends that the time for a restriction of expensive highway construction has come and that more attention should now be paid to the improvement of secondary roadways. He alleges that, as a result of his investigations, he is convinced that highway engineering is incapable of designing roads that will withstand the heavy truck traffic of to-day. He says that much of the present heavy traffic handled by motor trucks should be turned over to the railroads where it is needed and where it will not damage public improvements or add a heavy tax surcharge. The appearance of his remarks in a journal that is naturally sympathetic for the railway point of view will account for much of the bitterness of the attitude the author takes. He says in part:

"We have not learned how to build a road strong enough to carry present truck traffic. We do not, but if we did know how to build, it would probably be entirely too expensive. Heavy trucks are smashing our roads and adding a heavy tax surcharge to the 5 cents to 15 cents a ton-mile which they charge.

"Throughout the country we hear how the truck is helping solve the transportation problem; but it is forgotten, or at least not realized, that the true cost of this transportation is borne to a large extent by the taxpayer. Roads are breaking down They will continue to break down in spite of forty-eight different sets of cut-and-dry regulations, such as the Ohio Burke law. The most costly part of our $50,000 a mile improved roads will be gone in many places long before the bonds are paid.

"It seems to me it is time to build up the secondary roads with gravel or macadam to give the farmers opportunity to bring their products to market at all seasons of the year, but to cease building $50,000-per-mile roads, where a $5,000-a-mile road will serve the purpose."

Bassick in Canada

The Alemite Products Company, a subsidiary of the Bassick Manufacturing Company, will shortly begin the manufacture of Alemite products for the Canadian trade at Belleville, Ontario. The Belleville organization will start the manufacture of the Alemite lubrication system, the Gas-Co-Lator and perhaps one or two other products at once. Within a short time every item of the Bassick line will be manufactured in Canada for the Canadian trade.

W. E. Rowsome is general manager of the Belleville plant. Production is now under way.

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Army Materials Aid Road-Building

Through the Ingenuity of Highway Departments Millions of Dollars Worth of Army Trucks and Other Machinery and Supplies Have Been Employed for Constructive Uses

ONE hundred and forty million dollars is the estimated value of the surplus war material, supplies and equipment—motor trucks, cars, parts, etc.—transferred to the 48 states by the Department of Agriculture up to November 1. The only reservation made by the government in turning over these valuable supplies under the Wadsworth-Kahn Act is that they shall be used only in the construction and maintenance of roads.

Over 27,000 motor vehicles, both trucks and automobiles, and nearly $12,000,000 worth of spare parts for them have been included in the transfer, and in addition a great variety of machinery and supplies has been distributed, the mere listing of which requires ten closely typewritten pages.

Although all the material was purchased originally to meet the needs of the army in time of war, a large part of it can be utilized for highway construction without any alteration. In this class are hand tools of all kinds, such as picks, shovels, axes, adzes, chisels, etc., and machinery and equipment commonly used in road construction such as cranes, derricks, steam-shovels, wheel-barrows, jacks, and other items too numerous to mention.

In addition to such material as this, however, there were many other items of material declared surplus by the War Department which were not suitable for road-construction purposes in their existing form but which the states have found ways to alter and utilize to excellent advantage. The story of some of the ingenious and economical uses of this material, designed primarily for warlike purposes, forms an interesting chapter in the record of the tremendous salvaging operation which has been carried on under the Wadsworth-Kahn Act.

The motor trucks, of which over 23,000 have been transferred, are perhaps the most valuable equipment which the states have received. As they were received from the army they were generally not suitable for road-construction purposes, on account of the shape and size of their bodies, which were designed especially for army use. But the states have altered these bodies, in some cases in their own shops built for the purpose, thereby converting the trucks to a number of special uses.

The majority of the trucks have been altered by substituting dump bodies and hoisting devices for the cargo and ammunition bodies with which they were equipped when received. In some cases new bodies have been built outright; in others the army bodies have been converted. Idaho, for example, has converted the steel ammunition bodies into hopper bodies by installing false bottoms sloping from front and back to a pair of drop doors for bottom dumping which are controlled from the driver's seat. Maine has removed the cargo body from the chassis and by pivoting it near the rear end and adding a hoisting device has made the army body into a dump body. The same state and also Vermont have altered the army bodies by arranging the sides so that they can be dropped or raised, permitting the load to be dumped from the side of the truck.

Arizona decided that for road work the trucks equipped with steel ordnance bodies were too high and not wide enough. To make them suitable it cut the bottoms in half from front to back, and then used the sides for a new bottom and the two halves of the bottom for the new sides, thus making the body about twice as wide and half as high. The change makes it easier to shovel into the truck when necessary and also permits the hauling of more bulky material. In addition, the trucks have been equipped with hand hoists and offset bars on the rear end in order to pull road scrapers and drags.

In addition to using the trucks for hauling road materials many of them have also been converted to other uses. Army ambulances have needed few alterations to make them admirable survey cars. A few changes also convert these vehicles into trucks for the transportation of convicts to and from their work on the roads. Nearly all the states in which there is any snow problem at all have utilized a portion of their truck allotment in winter to push snow-plows; and one of the other common conversions is that which results in a very serviceable sprinkler truck.

Odd but ingenious use has been made by New Jersey of a Mack truck originally intended as a water-sprinkler and equipped with a centrifugal pump which was mounted beneath the tank and driven from the propeller-shaft. This was changed to a machine for spraying whitewash on poles along the state highways. The sprinkler heads at the rear were disconnected and two other connections were made from the outlet of the pump—one extending forward, the other to the rear. The forward connection was carried to pipes at each side which rise to the top of the cab and are there connected to garage car-washing swivels. The other connection enters the tank through the filling cap in the bottom. Inside the tank on this connection was placed an ell with a short nipple pointing forward. This connection was made for the purpose of agitating the whitewash mixture by pumping a part of the mixture back into the tank and, in order to increase the agitation, the nipple at the end of the connection was flattened. The spraying mixture is pumped through the forward connection, and the garage swivels, lengthened to 10 feet with 25 feet of hose attached, allow traffic to pass while the truck is at work.

Arizona has built a warehouse for the storage of its transferred equipment out of material also received from the government. The sides of the 50 by 100-foot building are covered with corrugated iron, of which some 5,000 sheets have been distributed by the bureau. The very efficient awnings over the office windows are made of extra tops for truck drivers' seats. In other states the problem of providing temporary storage space for transferred war materials has been solved by the use of the canvas airplane hangers, several hundred of which have been distributed.

Among the items which appear in the list of distributed materials are two described as "Shelters, elephant and trench." It would be difficult to imagine anything less likely to be of value in road construction than these heavy, semi-cylindrical bomb-proof iron shelters which were designed for the one purpose of protecting soldiers from shells. Yet thousands of these shelters have been distributed by the Department of Agriculture and put into service in a number of useful ways by the states. The most common use of them has been as storehouses and magazines for the storage of government TNT and powder. It is probable this use was suggested by the original purpose of the shelters. Colorado has departed a little further from the original purpose, and though it uses them for protective purposes, the protection sought is against the storms of the mountain passes in which they have been erected. Arizona has gone farthest afield in its ingenious use of them as culverts. In the large desert areas of the state it seldom rains, but the rain that does fall is likely to come in cloudbursts which flood the desert and frequently wipe out the roads which cross the wide, shallow drainage channels unless they are amply protected by culverts of liberal size. It is as a means of protection against these floods that the state is transforming the bomb-proof shelters into culverts. They are built on concrete foundations where sand and gravel are accessible, or on redwood in the absence of these materials. The rainfall is so infrequent and the desert soil is so porous that excess moisture is quickly absorbed, and it is thought that the shelters, well painted, even if not galvanized, will have a length of life which will amply justify the cost of installation.

Although no material has been sent to any state except upon the request of the state authorities, some question has been raised as to the value of certain materials for road work. One of the items questioned was the artillery harness, over 16,000 sets of which have been distributed. For army use this was made as breast harness, which differs from the hame harness commonly used. In its original form, therefore, it was valueless, but that it was far from valueless when properly altered has been shown by the experience of a num-

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ber of the states typified by the following report from Arizona. The state engineer says: "The breast harness received by the State of Arizona from the government has been changed to hame harness by our local saddleries at a cost of $10 per set. Thus changed each set is easily worth $40 to the state. We are now hiring stock without harness at a decreased price of $5 per team, so that the rent saved in three months pays all the expenses of freight on the harness and necessary alterations."

Until the transfer of war materials placed it in the hands of the state road builders TNT had never been used except by the army. In the popular mind it was regarded as the most dangerous of explosives—far more dangerous than dynamite—and entirely too dangerous for use except in time of war. This erroneous impression was dispelled by scientific investigation and the states were induced to try some of the explosive in their work. A single trial has been sufficient to convert the most suspicious blaster, and it is now generally preferred to dynamite by those who have used it. Nearly 20,000,000 pounds have been transferred to the states and the Bureau of Public Roads has used over 7,000,000 pounds in connection with its own work on the national forest roads.

Nearly 150 miles of pipe, of assorted types and sizes has been saved from useless deterioration and put to work by the several states. It is safe to say that it has been used in nearly all the ways pipe can be used. A great deal of it has been used to carry water to concrete mixers. Nebraska has used the 2-inch size for heating coils to warm the garages which house the war trucks; and a great deal of the same size has been used to form the hand-rails of bridges and culverts.

The building of bridges in the national forests has been materially aided by the special bridge material received from the War Department. This material, of which about 75 carloads have been received, consists of parts for I-beam bridges, fabricated truss sections, and a quantity of unfabricated steel shapes. Most interesting of this material are the sectional bridges. Two types of sections are provided, one type 17 feet 7½ inches long, to be used at the ends of the bridges, and the other, 11 feet 3 inches long, to be used as intermediate sections. Floor beams and stringers are included. The sections are uniformly 5 feet 11 inches deep, and when erected according to the army plans the trusses are spaced 14 feet apart and provide for an 11-foot roadway. They were designed to carry trucks and heavy artillery and will safely carry trucks of 15 tons gross weight for spans up to 114 feet. After the abutments are completed a bridge can be erected under favorable conditions in a few days at a cost of about $200.

The general attitude of the states toward the distribution of this material was recently manifested in a resolution of the executive committee of the American Association of State Highway Officials expressing the appreciation of the state departments. How valuable it has been to some of the states is shown by a recent statement issued by the Nebraska Department of Public Works, which says in part, "Financially the State of Nebraska was saved thousands of dollars by the receipt of the material, for by being in a position with our own construction organization [made up of this equipment] to take any contract at any time, we were able to force the keenest kind of competition and reduce bid prices to as low as or lower than those received in other states. With regard to mileage built, 60 per cent. of the road work completed this year in the state would have been totally untouched had the equipment not been available. Nearly 1,500 miles were constructed by gangs outfitted with this equipment.

The accompanying table (pages 38 and 39) show the distribution of army trucks by states and make.

ARMY MOTOR VEHICLES TRANSFERRED AS OF OCTOBER 1, 1921.

(Destination is State Highway Department unless otherwise stated.)

Destination.	Trucks.																
	Commerce	Denby	Federal	FWD	Garford	GMC	Gramm-Bernstein	Hurlburt	International	Kelly-Springfield	Mack	Moreland	Nash Quad	Packard	Peerless	Pierce-Arrow	Republic
Alabama	...	...	7	69	18	8	25	1	3	12	...	...	78	6	10	141	...
Arizona	...	1	16	58	...	6	...	1	15	17	4	...	92	8	10	20	2
Arkansas	1	2	6	54	...	9	...	1	4	51	...	...	113	19	39	36	19
California	10	...	1	47	...	12	...	1	33	20	..	52	218	90	23	50	2
Colorado	...	...	14	20	...	1	6	1	2	35	...	...	116	61	4	50	4
Connecticut	...	9	...	7	...	2	...	...	1	...	...	...	40	19	5	9	3
Delaware	...	3	...	2	...	5	...	...	...	...	...	...	11	4	2	8	...
Florida	...	...	...	13	2	9	...	...	20	12	...	...	77	23	30	8	...
Georgia	3	3	9	31	1	10	14	1	29	38	...	...	204	101	1	56	1
Idaho	...	...	9	54	...	...	...	...	3	18	...	...	120	6	...	26	...
Illinois	...	...	...	34	10	28	1	2	5	38	1	...	315	141	...	88	3
Indiana	...	...	23	84	1	10	8	1	2	47	...	...	254	...	9	53	35
Iowa	31	9	25	109	1	11	...	...	2	25	...	...	177	48	5	70	1
Kansas	...	...	15	93	...	14	...	1	8	14	...	...	251	1	...	75	22
Kentucky	...	11	2	63	1	10	1	1	6	52	...	...	157	6	33	13	...
Louisiana	...	...	13	44	1	5	...	1	23	...	...	...	117	2	20	4	10
Maine	...	1	...	14	...	4	...	...	1	4	...	...	75	20	15	16	...
Maryland	...	5	4	20	...	12	...	...	4	8	...	...	74	20	7	24	...
Massachusetts	...	...	13	...	...	5	...	1	2	...	...	...	64	39	11	49	...
Michigan	...	6	17	34	1	37	5	4	14	63	...	...	205	82	23	42	...
Minnesota	...	2	22	91	...	42	...	1	24	34	...	...	137	42	...	87	...
Mississippi	...	20	16	74	8	7	10	1	4	12	...	...	132	23	4	8	...
Missouri	...	3	2	110	...	14	...	1	12	45	...	...	263	59	4	57	27
Montana	...	9	15	116	...	...	6	1	...	13	...	...	153	9	...	31	...
Nebraska	...	...	34	84	28	...	...	1	3	...	...	...	177	19	2	7	2
Nevada	...	...	...	42	...	2	...	...	2	23	...	21	66	14	10	12	...
New Hampshire	...	...	...	5	...	4	...	...	3	3	...	...	40	16	3	3	3
New Jersey	2	9	10	14	3	18	...	19	6	11	25	...	45	24	10	40	4
New Mexico	...	...	...	82	...	2	...	1	2	11	...	6	144	37	12	5	...
New York	7	2	59	67	4	18	2	47	24	61	...	...	239	193	38	101	1
North Carolina	...	...	28	67	...	8	...	1	9	4	...	...	240	69	40	2	...
North Dakota	...	...	...	50	24	1	...	1	9	12	...	...	84	4	...	45	12
Ohio	...	...	5	...	...	22	...	1	4	31	12	1	404	92	31	41	...
Oklahoma	6	...	26	27	...	...	8	...	4	...	...	...	164	125	60	20	...
Oregon	...	...	1	40	...	...	...	1	2	23	...	28	128	1	...	38	...
Pennsylvania	...	10	2	53	8	26	2	10	14	52	...	...	287	140	35	97	8
Rhode Island	...	...	5	4	...	2	1	...	...	...	...	...	16	5	2	3	...
South Carolina	...	...	4	52	...	5	5	1	2	4	...	...	122	42	...	21	1
South Dakota	...	...	12	62	12	...	4	1	17	12	...	...	107	20	...	23	...
Tennessee	...	...	...	73	...	23	...	1	2	10	...	...	198	9	17	34	9
Texas	3	...	45	74	17	15	11	2	13	56	...	...	294	303	101	7	11
Utah	...	...	10	14	...	7	...	...	19	5	...	10	77	28	1	17	...
Vermont	...	...	...	5	...	2	...	5	...	...	...	...	33	9	4	5	3
Virginia	...	1	14	29	...	32	...	1	3	21	...	...	157	51	15	8	1
Washington	...	1	12	48	...	...	...	1	6	42	...	22	97	...	3	5	...
West Virginia	...	1	...	151	...	9	...	...	6	17	...	...	73	23	30	22	...
Wisconsin	...	1	...	82	18	9	...	1	2	26	...	...	122	45	...	51	...
Wyoming	...	1	10	80	9	6	...	...	2	12	3	3	86	14	...	4	...
Department of Agriculture	11	2	9	17	...	132	5	...	48	37	...	24	229	172	18	284	...
Totals	74	112	515	2,463	167	604	111	116	419	1,031	45	167	7,072	2,284	687	1,916	184

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Selling and Overhead Are Big Factors in Tire Prices

THESE CHARGES UP, BUT LABOR DOWN

Future tire prices depend as much on the trend of manufacturers' selling costs as on rubber and fabric prices. While figures compiled by a representative company show that material and direct labor cost of a tire is about 2 per cent. less than in 1914, overhead and distribution factors have increased about 10 per cent. And where overhead and distribution costs were formerly 110 per cent. of bench cost, they are now about 140 per cent.

The enigma of tire manufacturers today is selling costs. Mounting rapidly during the war, they have since been increased by mileage guarantees (now being abolished), maintenance of elaborate distributing stations and unstable discounts. A tire's share of total overhead expenses, taxes, depreciation, discounts, and selling costs is now $10, against $13.34 in 1920, $9.31 in 1917, and $9.02 in 1914, according to one company's cost records.

The retail price of a 32x4 good grade fabric tire, taken as a composite of output of the company referred to, is now $24.90, or $1.75 higher than in 1914, notwithstanding a slightly lower bench cost. Whether the retail price level is to be further reduced may be said to depend almost entirely on reduction of selling and overhead costs, and since office expenses have been so thoroughly decreased by most companies, selling costs are doubtless the most likely to be attacked.

About two-thirds of all tires are sold to dealers and the remainder to vehicle manufacturers. Competition of late has resulted in some instances of large quantities being sold to manufacturers at a price around $55 per set (four tires) that according to schedule should have sold for about $80 per set. The discount, it is understood, has been charged to selling expense. Sales to dealers, on the other hand, have been maintained more nearly at established dealer prices. It would seem therefore that the price of retail tires can not be sharply revised, if, against these two-thirds of total sales, must be charged thousands of dollars of discounts and selling costs on the one-third sold to vehicle manufacturers.

There are 4.62 pounds of fabric in a 32x4 tire. At $1 a pound, the cost of the fabric now being used up by the company referred to, the fabric content it $4.62. The amount of rubber in the same tire is 8.43 pounds, which, at 25 cents a pound, would cost $2.21. The direct labor cost is now around $1 a tire, which brings the present bench cost up to $7.83. Should this company's costs be computed on prevailing fabric and rubber quotations (fabric at 80 cents and rubber at 20 cents), the bench cost would drop $1.46, or to $7.37 a tire against $7.83, figuring materials on present inventory cost. But should rubber prices return to 50 cents a pound, the rubber content would jump to $4.42 and the bench cost to $9.94. A 10-cent change in the rubber price makes about a dollar's difference in the bench cost of a tire, while fabric prices must move about 20 cents to effect the bench cost $1.

The direct labor cost per tire, which in 1914 was approximately 25 per cent. of the bench cost, is now between 75 cents and $1, or about 12½ per cent. of the bench cost. The introduction of machine methods in tire making was largely responsible for the decrease from $1.61 a tire in 1914 to $1.50 in 1917, but wage advances and spread of inefficiency during the war brought labor cost up to around $2 a tire at the peak of the 1920 inflation, notwithstanding machine manufacturing.

ARMY MOTOR VEHICLES TRANSFERRED AS OF OCTOBER 1, 1921.—Continued.

(Destination is State Highway Department unless otherwise stated.)

Destination.	Trucks										Cars			Totals		
	Riker	Selden	Standard	Velie	White	Wilson	Liberty "B" Class	Light Aviation	Heavy Aviation	All Others	Dodge	Ford	All Others	Cars	Trucks	Cars and Trucks
Alabama	...	...	1	1	7	1	18	10	21	...	30	55	3	88	438	526
Arizona	...	...	7	1	...	...	...	...	15	1	...	22	3	25	274	299
Arkansas	...	...	...	...	1	...	...	4	18	15	...	57	8	65	392	457
California	...	...	5	4	5	...	...	14	28	3	4	75	14	93	618	711
Colorado	...	10	...	...	2	...	20	8	17	7	14	40	3	57	378	435
Connecticut	...	5	...	...	...	...	12	3	10	2	6	15	5	26	127	153
Delaware	8	1	...	...	...	...	...	1	3	...	...	7	5	12	48	60
Florida	...	...	4	22	1	...	4	...	2	...	30	34	5	69	227	296
Georgia	...	2	4	24	...	...	21	13	31	...	13	99	11	123	597	720
Idaho	...	...	..	17	...	...	...	6	4	3	7	24	6	37	266	303
Illinois	...	20	. .	11	2	...	170	20	41	16	26	114	24	164	946	1,110
Indiana	...	...	1	1	...	1	55	...	...	2	9	74	11	94	587	681
Iowa	...	...	...	...	6	1	86	26	34	6	21	65	4	90	673	763
Kansas	...	...	...	...	45	...	93	44	39	...	22	66	5	93	715	808
Kentucky	11	...	...	...	1	1	20	...	18	2	18	49	5	72	409	481
Louisiana	...	...	...	...	1	...	...	10	28	.	6	41	7	54	279	333
Maine	...	...	3	9	...	...	...	4	5	6	9	25	3	37	177	214
Maryland	9	...	...	3	...	...	...	...	8	...	8	16	3	27	198	225
Massachusetts	...	...	...	...	3	...	...	...	14	...	...	23	2	25	201	226
Michigan	10	...	9	...	3	1	57	1	53	...	9	54	26	89	667	756
Minnesota	20	...	...	1	...	...	20	32	28	2	24	52	14	90	585	675
Mississippi	...	...	3	13	3	...	36	8	27	2	21	55	6	82	411	493
Missouri	...	...	...	2	17	2	138	...	34	1	18	68	11	97	791	888
Montana	...	...	...	32	...	...	...	...	...	...	12	42	4	58	385	443
Nebraska	...	12	...	57	...	...	16	8	...	...	13	66	13	92	450	542
Nevada	...	...	...	...	...	...	...	...	23	...	1	20	6	27	215	242
New Hampshire	...	9	...	...	...	...	8	2	4	...	3	9	2	14	103	117
New Jersey	15	12	...	11	...	...	...	...	...	14	2	57	17	76	292	368
New Mexico	...	1	...	38	10	...	1	...	...	...	5	29	...	34	352	386
New York	...	3	6	...	1	32	114	32	63	9	19	125	12	156	1,123	1,279
North Carolina	...	...	4	...	...	...	...	11	35	...	12	76	5	93	518	611
North Dakota	...	...	10	23	3	...	24	7	11	...	18	30	4	52	320	372
Ohio	20	3	1	...	2	...	93	17	74	2	39	96	20	155	856	1,011
Oklahoma	...	...	...	...	...	...	12	...	2	...	18	42	4	64	454	518
Oregon	...	...	4	...	...	...	12	...	15	...	...	38	6	44	293	337
Pennsylvania	...	2	3	...	4	2	...	10	75	2	4	115	22	141	842	983
Rhode Island	...	3	...	...	...	...	10	1	3	...	3	3	2	8	55	63
South Carolina	...	...	...	9	1	...	8	7	18	1	21	28	3	52	303	355
South Dakota	20	...	3	...	1	3	35	11	18	...	10	43	4	57	361	418
Tennessee	27	6	2	3	1	...	22	11	41	11	16	75	11	102	500	602
Texas	...	...	14	12	24	6	83	54	73	10	37	138	56	231	1,228	1,459
Utah	...	...	...	9	...	...	10	...	12	...	...	22	1	23	219	242
Vermont	...	5	...	...	...	...	25	2	5	3	5	7	...	12	106	118
Virginia	...	21	...	...	...	...	22	1	32	...	12	48	11	71	409	480
Washington	...	...	2	...	...	...	36	14	14	...	...	37	7	44	303	347
West Virginia	...	1	...	...	...	...	...	5	24	...	...	24	7	31	362	393
Wisconsin	56	13	...	...	1	...	18	24	39	...	16	47	13	76	508	584
Wyoming	...	...	...	...	...	...	...	...	...	...	...	24	4	27	231	258
Department of Agriculture	...	...	150	16	2	8	...	88	31	3	61	291	80	432	1,286	1,718
Totals	196	129	237	319	147	58	1,299	509	1,090	123	622	2,662	498	3,782	22,077	25,859

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Correspondence

General Correspondence, Criticisms, Suggestions, and Discussions Concerning Any Subject of Interest to Those Who Design, Manufacture, Sell or Use Commercial Motor Vehicles, Their Parts or Accessory Equipment, Are Solicited

Heavy Trucks and the Roads

To the Editor--Schemes for the construction of new roads and the reconstruction of those already existing are at present receiving considerable attention both from a traffic point of view and in connection with unemployment. Yet, whatever is done, on whatever grounds, the problem of finance—the question where the money is to come from—has to be faced. This being so, it devolves upon those who are concerned with motor transport, and the organizations representing them, to keep a careful watch over events and possibilities.

There is no doubt that the alleged effect of heavy vehicle traffic is being constantly emphasized by road authorities. To the growing volume of such traffic is attributed (1) the shorter life of existing surfaces, and (2) the necessity for widenings or for new roads. Attempts are quite clearly being made to show that to bring roads up to a standard fit to bear such traffic, much more costly forms of surfacing and resurfacing are called for than would otherwise be necessary. It is further contended that, this being the case, it is unfair to make vehicles for which the less expensive standard would be quite adequate and suitable, contribute to the cost. If heavy traffic really needs special roads (we are told), such heavy traffic must pay.

It may be some little time before this situation will fully develop; but that this is the tendency only those blind to facts can deny. It is the position that must sooner or later be faced; indeed, some of the motor transport fraternity are facing it already; and there are a few who would be willing to pay more in taxation in return for some concession in the way of weight, dimensions, and speed limits. This attitude, of course, is based on the belief that progress in motor haulage will be in the direction of heavier units as well as greater speeds. This belief is no doubt also shared by others with different views on the taxation question. Most of us think that heavy vehicles are paying enough, and do not consider the economic and industrial position to be such that any further burden should be imposed upon them. Heavier taxation, on whatever ground, it is contended, would seriously impede the further development of motor transport and any enterprises based thereon.

This view may be unassailably sound; but the case for those who hold that, if an expansion of heavy transport renders necessary a standard of road construction over and above that required for ordinary traffic, the heavy should be taxed accordingly —this is also difficult to traverse.

Therefore, it looks as though we must make up our minds whether we actually want those extra strong roads; and if we do want them, we shall probably be called upon to pay for them. The answer to the question here involved, however, depends upon whether those are right who say that development must be in the direction of heavier units as well as higher speeds.

There is reason to doubt this. The war and its after-effects have given the heavy truck an altogether illusory—one might even say mischievous—prominence. The extent of this is now beginning to be realized, and a reaction has set in in favor of the lighter type of vehicle designed within limits that permit without question of pneumatic tiring. Even motor stage enterprise has found advantages in the smaller cars in spite of relative restricted seating capacity. There are indeed quite definite indications that the future of motor coaching is with the lighter and swifter "express" type of vehicle, leaving those of the present conventional "big" category to a relatively limited scope. Thus, we find, both in freight and passenger-carrying, whatever the enthusiasts may say, the trend is towards speed and lightness, to which the standards of road construction as hitherto understood are tolerably adequate. The tendency hitherto prevalent towards heavy vehicles is merely a phase, and an attempt to develop speed on this basis is wrongly conceived. Heavy loads can be taken over long distances at speeds that will not damage ordinary good motor roads, and still beat the railways on a point-to-point comparison; but where the distance is so great as to make this impossible, it will more than probably be found that road transport is not the most advantageous.

What it all boils down to is this. We must be careful lest through miscalculation and misapprehension we may find motor transport asking for more than it really wants in the way of roads, and being saddled with needlessly oppressive burdens in consequence. Manufacturers have concentrated overmuch on the heavy truck. There is a real risk of the user making the same mistake.

C. G.

Detroit, Michigan.

Points in Professional Haulage

To the Editor—After reading the discussion of both rail and truck arguments for transportation of freight, I am prompted to make a few comments. We are old in transportation business, doing local hauling in Cincinnati since 1880 and inter-city by truck since 1918, operating daily service between Cincinnati, Hamilton, Middletown, Franklin, Miamisburg, West Carrollton and Dayton. We have undertaken to establish our business on two things necessary to successful operation: "Service" and "Protection" to shippers.

The ship-by-truck movement is being retarded by some operators getting into it purely on a price basis; that is, quoting rates the same as rail and in some cases less, and throwing in the pick-up and delivery service. Any reasonable shipper is willing to pay a fair rate. The pick-up and delivery is a big part of the cost and must be taken into consideration when a comparison in rate is made.

To maintain service properly extra equipment should be carried on hand for relief in case of break-down, and to take care of peak-load or overflow shipments. It is also necessary that shippers along the route traversed should be able to reach us promptly and obtain necessary information as to the movement of their shipments. We maintain a place of business in each town for this part of the service, and have at these points men who are familiar with transportation and in many cases are of great help to shippers who are looking for truck service. We also maintain our own service-station and garage at our Cincinnati headquarters, where we are in a position to give daily inspection and attention to necessary repairs and keep equipment in the best of condition.

Now, regarding protection, we carry cargo insurance to the extent of $4,000 per load, while goods are in transit, also carry insurance at our depots and service-stations while shipments are at these points. While talking of insurance, I might relate a case that happened just recently. One of the Ohio River packet lines suffered the loss of one of its steamers which sank with a capacity load of shipments, and, while the packet line is not required to protect shippers against loss, quite a number of shippers were under the impression that the packet company insured them against loss and, therefore, were not protected. Since this time we have had several inquiries from the civic and commercial organizations as to our method of protecting shippers. The point I wish to make clear is that too often a shipper will turn shipments over to a truck line not offering this protection and lose sight of the protection feature when he sees a saving in the rate, and in the long run this carelessness is costly. We believe that all truck lines should protect the shipper, thereby putting this method of transportation on a sound basis.

A feature not mentioned is the marking of shipments. While it is necessary to mark small shipments, we are handling numerous large shipments without marking. This is a saving to the shipper as in marking shipments it is necessary to handle them and they consume considerable time and expense in this operation.

Service such as this stands out to the firms doing erecting work. All that is necessary is to load on the truck and within a few hours the material is on the job ready to be installed. This relieves these firms of the expense of boarding erectors at hotels, awaiting the arrival of material, and saves them the annoyance and loss of time getting material hauled from the depot to the job.

C & D Motor Delivery Co.
Louis J. Hughes.

Cincinnati, Ohio.

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Smith Wheels are made in three types—the Standard type, of which we have made and sold more than 265,000; the Pneumatic type, and the Cushion type—a complete line for the Truck Maker, the Truck Dealer and Agent, the Tire Dealer and Agent and for all Accessory Houses to handle.

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SMITH WHEEL
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The Service Rail Motor

In 1914 the first railway motor coach built by the Service Motor Truck Company was put in operation, according to Charles Guernsey, general manager of that concern's railroad division. It was used by a little railroad down in Tennessee, and is still in operation. It was built on a 1½-ton truck and, in view of the modern railway motor coach, is rather an impossible looking outfit. During the seven years following this first installation, there has been a constant increase in the interest paid the railway motor coach, and about a year ago the railroad division of the Service company was organized, and began devoting especial attention to this field.

The company is now producing a coach having a seating capacity of 30 passengers, and a normal speed ranging from 25 to 30 miles an hour, depending upon the gear ratios and local operating conditions. Gear ratios are varied, of course, depending upon the grades and curves of the particular road over which the car is to operate. The chassis is a truck chassis, especially adapted for rail operation. The front axle is replaced by a 4-wheeled pony truck, having chilled iron wheels, solid car type axles, plain brass bearings and a swing-motion bolster. The rear axle is of the worm-drive type, fully inclosed and running in oil. The wheels are 32 inch outside diameter, fitted with M. C. B. standard rolled steel tires. A special transmission is provided, so that this car has 4 speeds forward and 4 speeds reverse. While the car is normally intended for operating in the forward direction, it can, if necessary, be backed at full speed, as in backing into a terminal. The engine is a 4¼ by 5½-inch, 4-cylinder, truck type engine, actually developing 40 horse-power, at its rated speed of 1,400 revolutions per minute.

The clutch is of the single plate type, driving to a special reversing transmission through fabric universal-joints. From the reversing transmission drive is taken by additional fabric joints to a 4-speed amidships transmission, and then by metal joints fully inclosed, to the rear axle. One feature of this car is that all major bearings, such as wheel-bearings, worm-bearings, transmission-bearings, as well as engine main-bearings and connecting-rod bearings, are adjustable for wear.

On an experience of over 25,000 miles in actual service this car has shown the following results: Normal speed, 30 miles per hour; hill-climbing ability, 2 per cent. grades on high gear; 4 per cent. grade, pulling a loaded trailer weighing a total of about 6 tons, on third gear at 15 miles per hour; gasolene consumption, 10 miles per gallon; oil consumption, 400 miles per gallon. The total cost per day in this particular case, on a round trip of 84 miles, is under $10.00. This includes all expenses up to date, for crew, gasolene, oil and maintenance. The earnings in this particular case have been well over $30.00 per day. The results have been so satisfactory that the railroad operating this car is voluntarily doubling the passenger service to its patrons, which is, indeed, a unique situation for a short-line railroad.

The coach work consists of a 'bus type body. Entrances are provided on both sides near the front end, and are controlled by the motorman from his position. The seats are rattan-covered, with spring bottoms. Lighting is by an electric generator and storage-battery, the lights being adequate for reading. The car is equipped with an electric self-starter.

The gasolene capacity is 40 gallons. A steel locomotive-type pilot is provided. The front fenders extend over the front truck. Two sets of brakes are provided—one operated by a foot pedal, the other operated by a hand lever and acting on the rear wheel drums. Brakes on the front truck can be provided at an additional cost. Hand-operated mechanical sanders are provided on both sides of the driving wheels. The rear wheels are of a special Mead cushion type, developed for railroad work. These wheels, together with the swing-motion truck and other cushioning features, such as fabric universal-joints, combine to give an exceptionally smooth, easy-riding car. The price of this car, according to the specifications given, is $8,300.00 f. o. b. Wabash, Indiana, painted to customer's specifications.

The railroad division of the Service Motor Truck Company has also had under development, since last March, a larger car which will be announced later.

The Steinmetz Electric Truck

The Steinmetz Electric Motor Car Corporation, Arlington, Baltimore, Maryland, has announced particulars regarding its model, a ¾-ton machine with double-reduction drive. The machine is driven by a single motor, hung lengthwise of the chassis and driving through bevel and spur-gears to the rear wheels. The battery is placed under a hood at the forward end of the frame. The motor is wound for 80 volts and 35 amperes and has a normal speed of 2,100 revolutions per minute. Through the bevel-gears the reduction is 43 to 11 and through the spur-gears 55 to 16.

The vehicle has a wheel-base of 114 inches, a gage of 57½ inches, and a turning circle of 40 feet diameter. It is 178 inches long over all and 66 inches wide, and has a loading space of 84 inches long which will take a maximum body length of 96 inches. The weight of the chassis without battery is 2,300 pounds and of the battery from 1,300 to 1,760 according to the type used. Six hundred and fifty pounds has been allowed for the weight of the body

On a single battery charge the machine will run from 50 to 60 miles on the level and from 42 to 55 miles in average hilly territory, depending on the battery equipment. The speed will run from 14½ to 16 miles an hour with and without load, the variation being due to the battery capacity.

The frame is of pressed-steel, the front axle is a drop-forging and the rear axle housing a pressed-steel unit. The front springs measure 36 by 2 inches and have 8 leaves; the rear springs measure 46 by 2 inches and have 9 leaves. Thirty-three by 5-inch pneumatic cord tires are provided on all wheels, and standard equipment includes 3 electric lights, speedometer, charging-plug, charging-cable, horn, switches, and the necessary tools.

Clark Axles at Shows

Four new axles, besides its regular line of internal-gear axles, are being shown by the Clark Equipment Company, Buchanan, Michigan, at the New York and Chicago automobile shows. Two models of a new bevel-gear axle for speed work on light trucks attract attention: Model B, a 1- to 1½-ton model, and model C, for trucks of ¾- to 1-ton capacity, both designed for use with pneumatic tires. A special road-building axle of 2½-ton capacity, 8,000-pound spring-pad allowance, of the internal-gear type is also on exhibit in addition to a specially designed 'bus axle having a 71-inch tread, and a 3½-ton "over-head" internal-gear axle which presents some unique features in truck axle design.

Propeller-Shaft Standards

The use of larger and heavier motor trucks during the last few years for hauling miscellaneous kinds of freight has resulted in lengthening the wheel-base to such an extent that an additional support at or near the center of the propeller-shaft has become necessary. Propeller-shafts so supported are known as 3-joint propeller-shafts, since three universal-joints are used, one at the transmission, one at the differential and one at the central support. Increasing use of this type of drive has resulted in a great number of different designs for the rear end of the forward shaft on which the center bearing is mounted.

Realizing that the 3-joint propeller-shaft has been in use long enough to warrant standardization the rear end of this forward shaft, the Society of Automotive Engineers was requested to undertake this work. The subject was assigned to the Truck Standards Committee and a subdivision, consisting of J. R. Coleman of the Selden Motor Truck Company, H. B. Knap of the Packard Motor Car Company and J. W. B. Pearce of the Spicer Manufacturing Company, was appointed to obtain information on present practice and to prepare a tentative standard.

A progress report was submitted by this subdivision in April, 1921, and it was discussed at the Truck Division meeting at that time. It was the consensus of opinion of the truck manufacturers represented that the adoption of a standard for the front-shaft rear shaft-ends was most desirable and would result in a considerable economy in manufacturing, assembling and servicing. A final report was therefore prepared and it will be considered at the S. A. E. Standards Committee meeting to be held in the Engineering Societies Building, New York City, on January 10. The proposed standard is, of course, still open to revision and it is suggested that anyone interested in it should review the report to ascertain whether or not it is feasible to incorporate the recommended dimensions in future designs.

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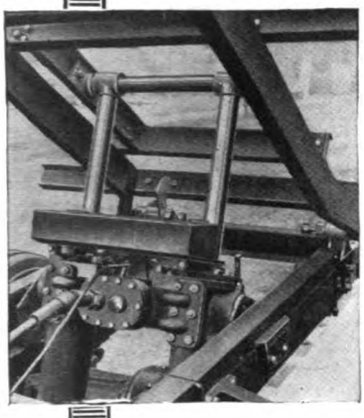

Typical installation of Hydro Hoist. Notice absence of high pressure piping, cables, rollers, arms and pulleys.

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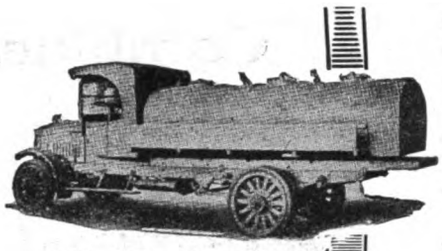

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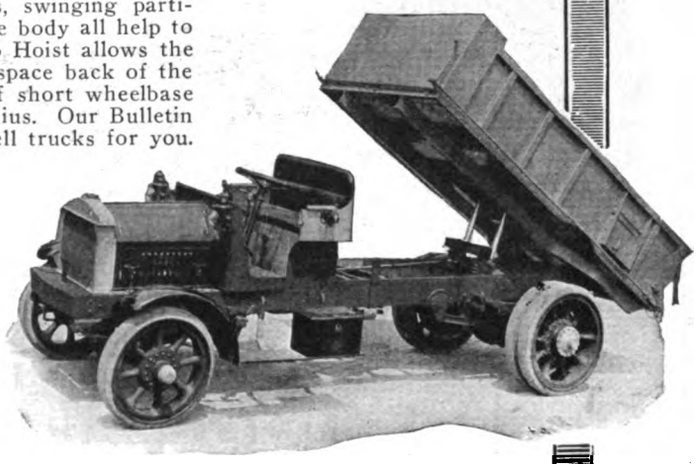

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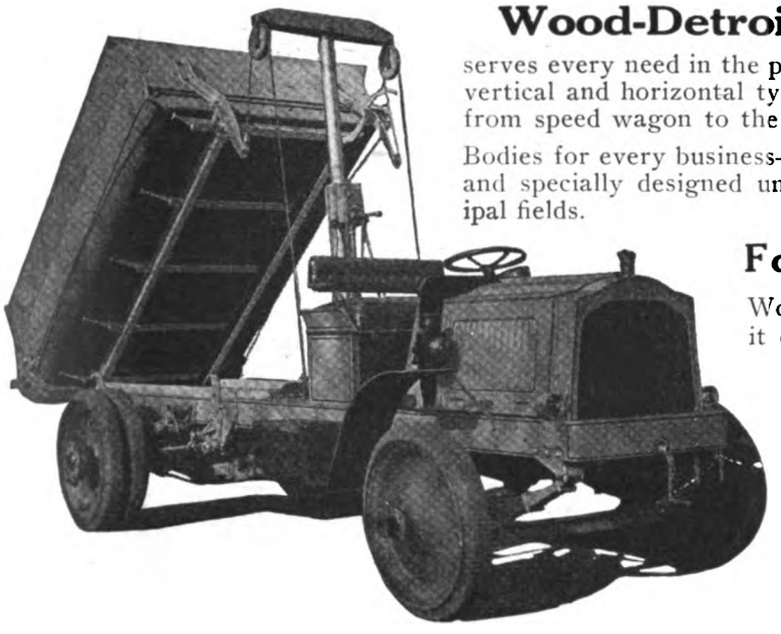

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serves every need in the power dumping field. Hoists are made in both vertical and horizontal types; and in capacities suitable for all chassis, from speed wagon to the largest heavy-duty models.

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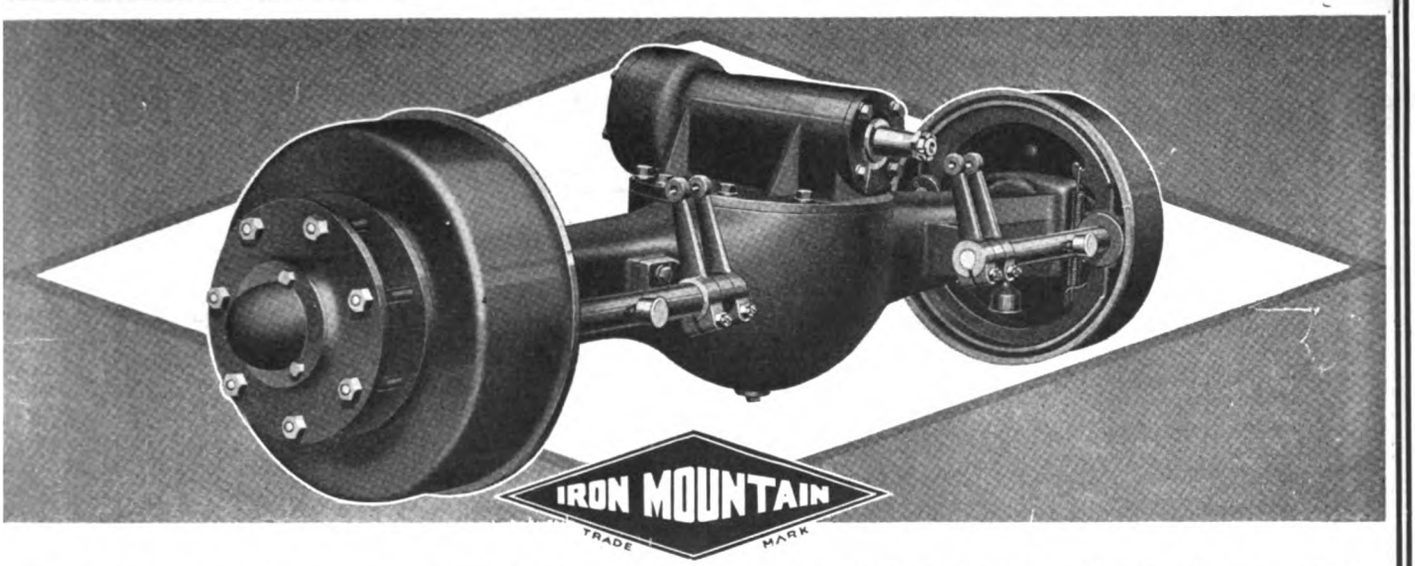

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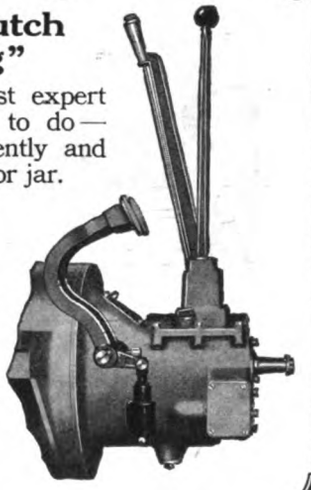

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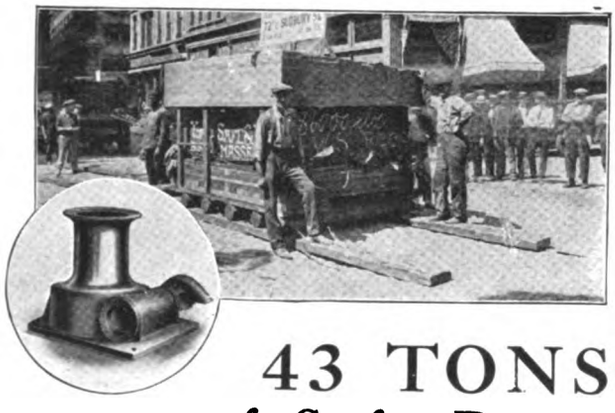

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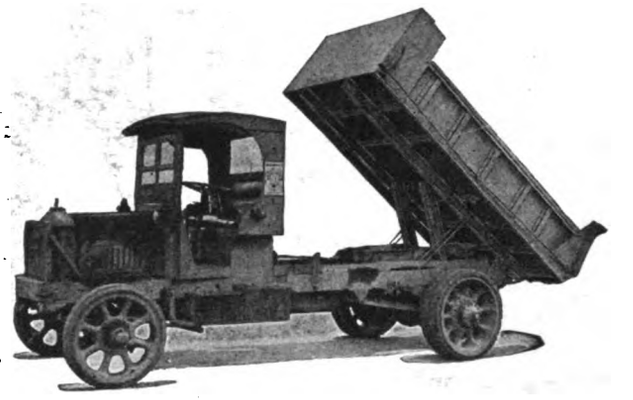

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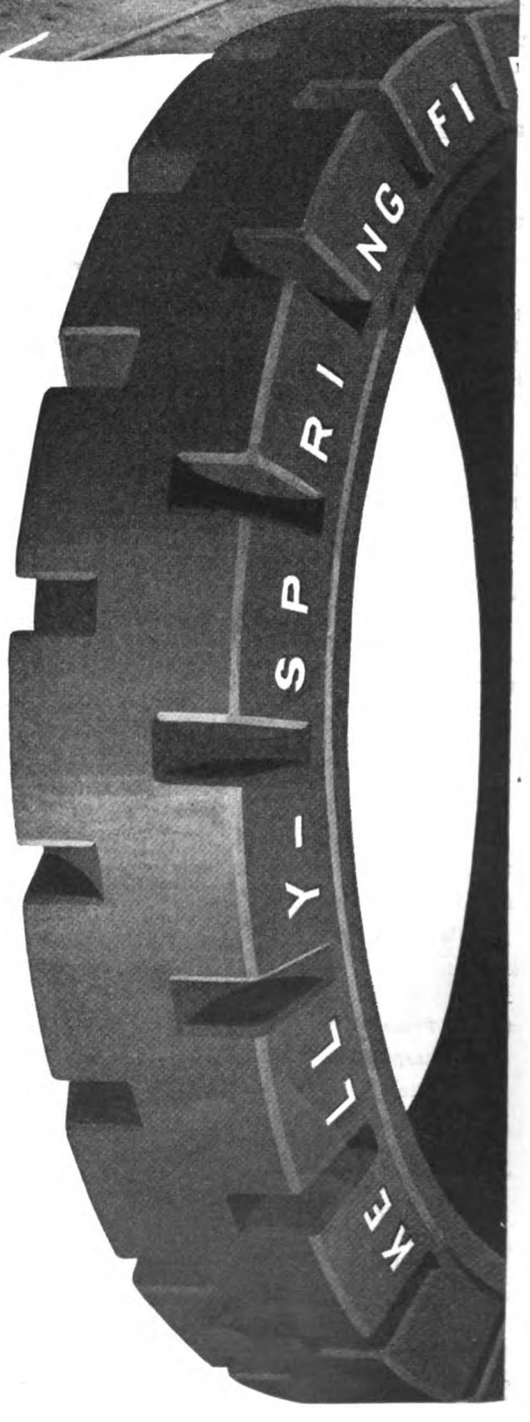

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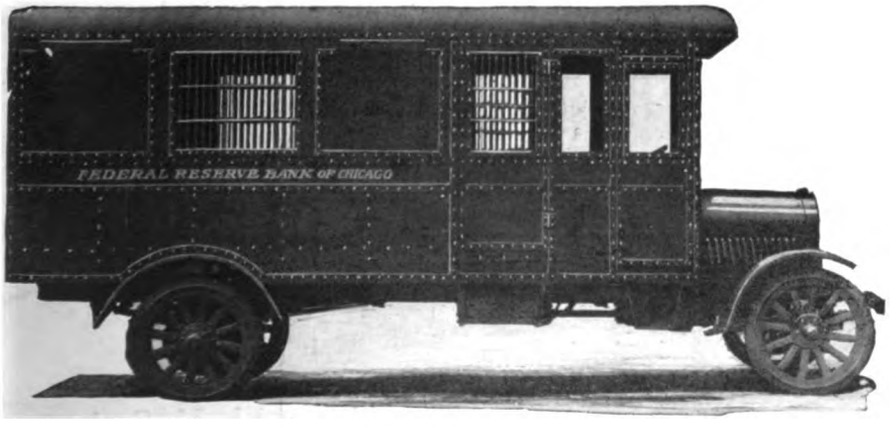

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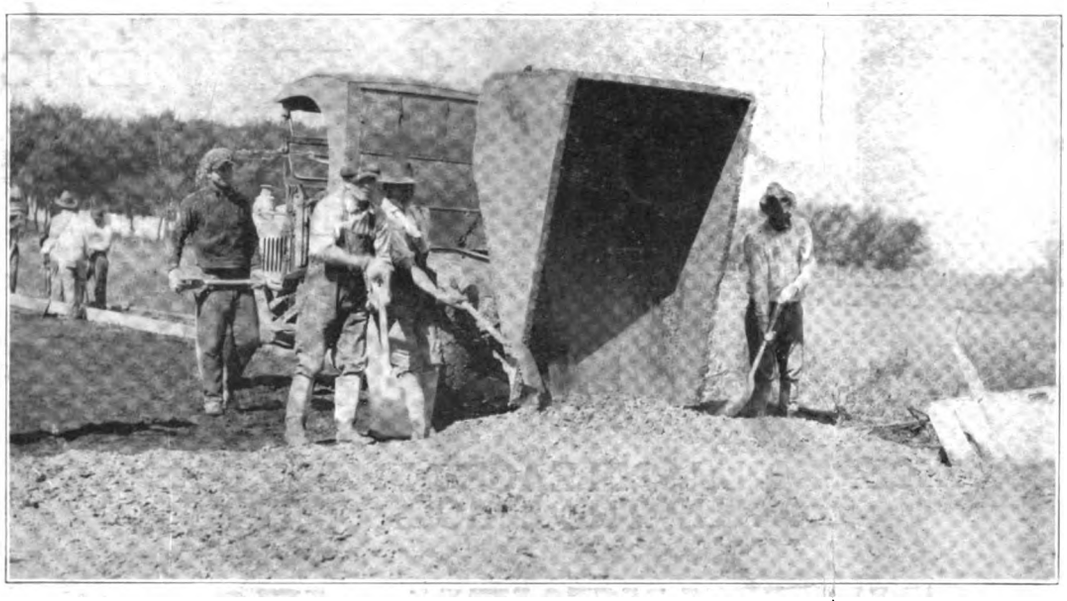
Lee Automatic End Dump Body

"NO HOIST"



A 2-yd. single-hopper body on a 2-ton truck hauling wet concrete.

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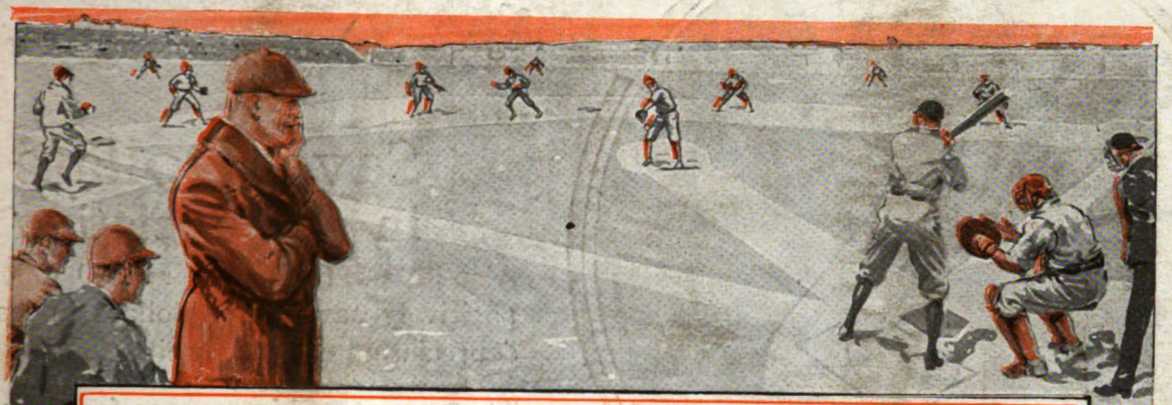

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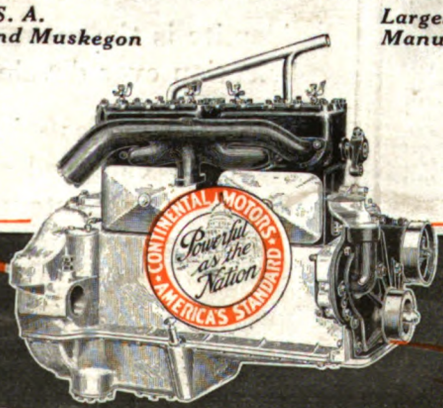

Continental Motors

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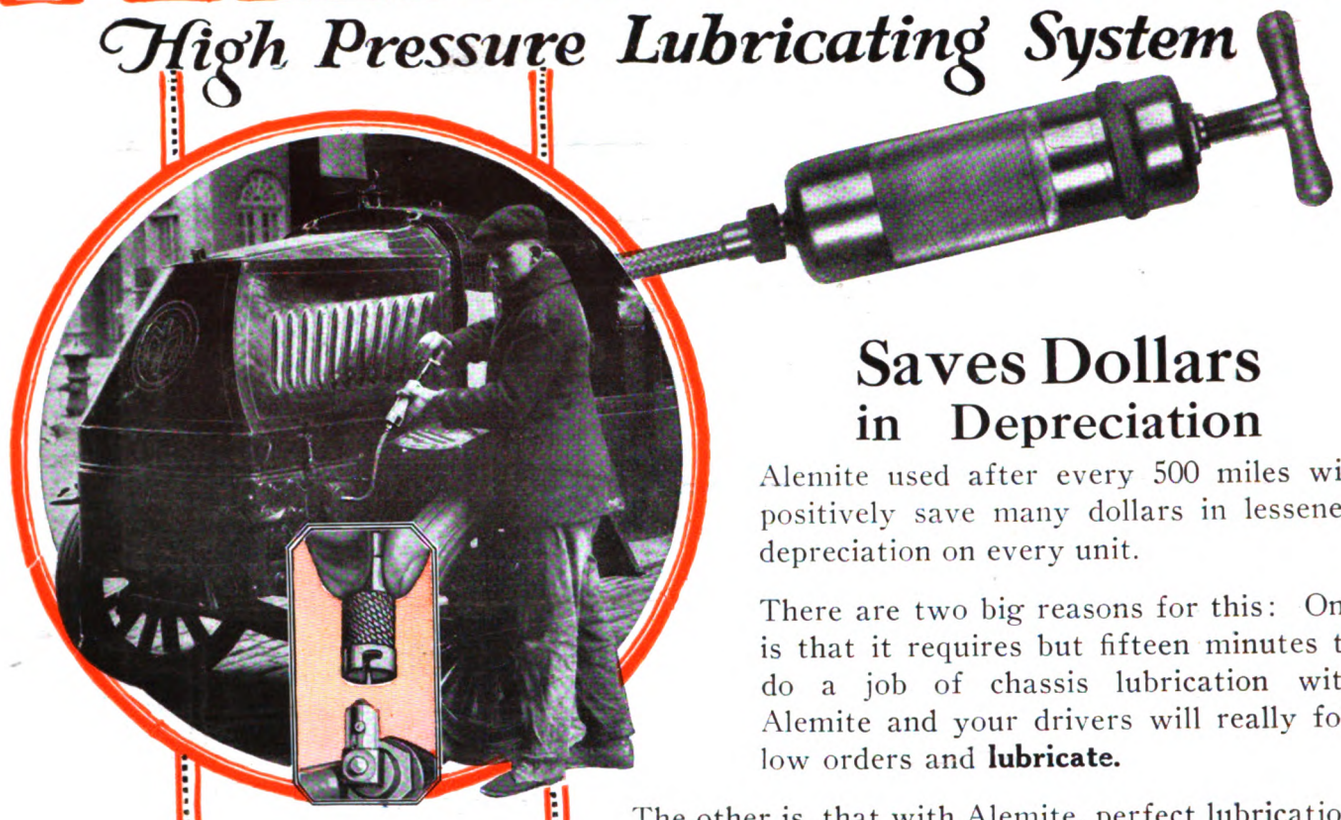
ALEMITE

High Pressure Lubricating System



Saves Dollars in Depreciation

Alemite used after every 500 miles will positively save many dollars in lessened depreciation on every unit.

There are two big reasons for this: One is that it requires but fifteen minutes to do a job of chassis lubrication with Alemite and your drivers will really follow orders and **lubricate.**

The other is, that with Alemite, perfect lubrication is absolutely certain because the old grit-laden grease is forced out of the bearings as the new, clean grease is forced in.

Compare the time required for chassis lubrication the old way with the short time required with Alemite. This saving alone is worth many times the initial cost of an Alemite installation.

Alemite is the most efficient method of chassis lubrication ever developed.

Over 150 makes of cars, trucks and tractors are standard equipped with Alemite High Pressure Lubricating Systems. The next truck you buy should be so equipped. If your present truck is not, get in touch with the Alemite distributor nearest you. There is an Alemite Station in every large center.

Use Alemite this way:—

Just slip the handy bayonet-slot coupling on the ball-check fitting, give an eighth turn, where it locks. Give the handle of the Compressor a turn or two and a pressure of 500 pounds is exerted, absolutely forcing old grease out and new in.

Inaccessible parts are easily reached and almost instantaneously cleaned and lubricated.

The following distributing Stations are in charge of Service and Retail Sales in their respective territories. Address Alemite Lubricator Co., at the address given.

Baltimore, Md. .106 W. Mt. Royal Avenue
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Bridgeport, Conn. . . .577 Fairfield Avenue
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Butte, Montana . . . .55 W. Granite Street
Calgary, Alberta, Can. . .216 12th Ave., W.
Alemite Lubricator Co. of Canada, N. W.
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Chicago, Ill. . . . .2641 S. Michigan Avenue
Cleveland, Ohio . . . . .4612 Euclid Avenue
Dallas, Texas . . . . . 408 S. Ervay Street
Denver, Colorado . . . . . 1245 Broadway
Detroit, Mich. . . .4750 Woodward Avenue
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Fargo, N. Dak. .324 Northern Pacific Ave.
Indianapolis, Ind. . .1005½ N. Meridian St.
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Distributors Alemite High Pressure Lubricating System, Bassick Graphite Penetrating Oil, Bassick Lubricant and Gas-colator.

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Transport One-Ton a Real Quality Job Completely Equipped for Every Speed Service

You have read about the others. Now—get the full specifications of Rapid Transport Model 15. Observe the quality of every part—from the Continental Red Seal motor, throughout. Compare the amount of Rapid Transport's equipment—cord tires, electric lights and starter, motometer, speedometer, seat, windshield, fenders, running boards, all included in the chassis price, $1295. Here is the speed truck that meets the widest range of demand—built to the Transport Standards in every respect—backed by the Permanency of Transport, and its remarkable success in sale-building. Ask for the Evidence!

A Complete Line—at Lowest Prices

Model 15, 1-ton Chassis complete. $1295

Model 25, 1½-ton, complete with electric lights, bumper, radiator guards, hubodometer and motometer. $1495

Model 35, 2-ton capacity, equipped with radius rods, drive-shaft, brake, four-speed transmission and electric lights, bumper, hubodometer and motometer $1885

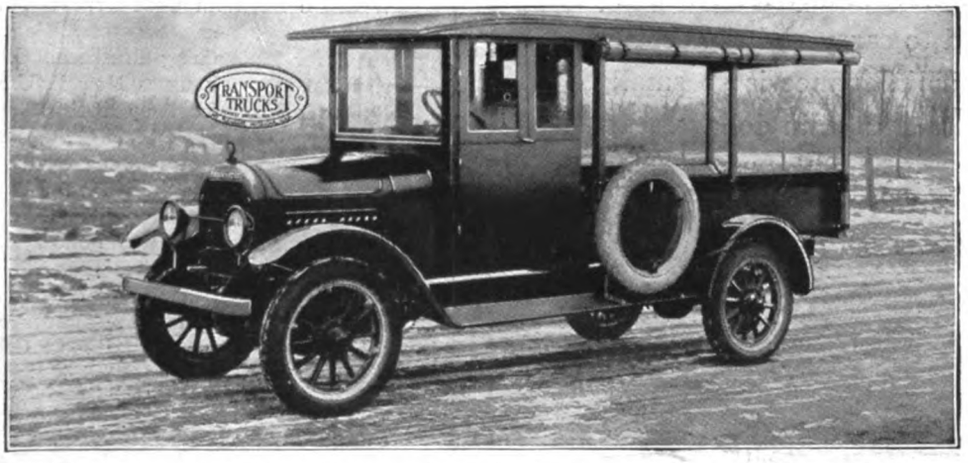
Model 55, 3-ton capacity (same equipment as Model 35) $2385

Model 60, 3½-ton capacity (same equipment as Model 35) $2585

Model 75, 5-ton capacity (same equipment as Model 35) $3485

DEALERS: Transport opens 1922 with a line that makes a prospect for you of every user of transportation and trucking in your territory. Let us give you full details of the Transport's liberal franchise. A Transport representative will call on you at your request. Write us.

The "Rapid Transport" One of the Six Transport Models



Transport Truck Co. Mount Pleasant Michigan

TRANSPORT

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In the majority of cases where a dealer sells a chassis to be equipped with a dump body and hoist he either recommends or supplies the equipment.

A motor truck is not a profitable investment unless it is kept continuously in service, and the loss to the owner is just the same whether it is laid up on account of non-performance of truck or equipment.

You can bank your reputation and that of your truck on the

Hough Mechanical Hoist

It will function every time your engine will. It will elevate any load which your truck is rated to carry and the cost of operation and maintenance is so small that it cannot be computed in dollars.

Hough Mechanical Hoist Co.

1900 Southport Ave. Chicago, Illinois

POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

Published monthly by

THE POWER WAGON PUBLISHING COMPANY

544 Lake Shore Drive, Chicago, U. S. A.

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THE POWER WAGON PUBLISHING COMPANY

WALTER WARDROP, *President and General Manager*

STANLEY A. PHILLIPS, *Vice-President and Editor*

Executive and Editorial Offices, 544 Lake Shore Drive, Chicago.

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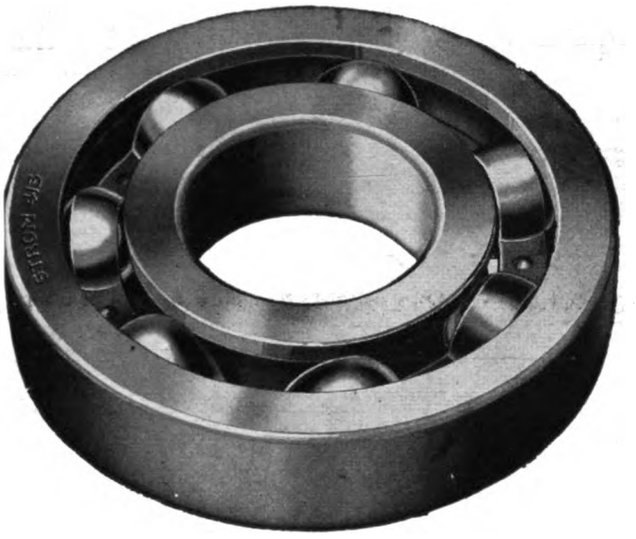

Strom Bearings Increase Motive Power By Practically Eliminating Friction

Strom Bearing equipped trucks cost less to operate because friction in all moving parts is reduced to a minimum. Shafts unhampered by frictional resistance transmit full power to the wheels.

Made of the best materials and heat treated by the most modern and approved methods Strom Bearings give maximum service under the most severe conditions.

Strom engineers have had years of experience in selecting correct bearings for automotive applications. They are at your service.

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Strom BEARINGS

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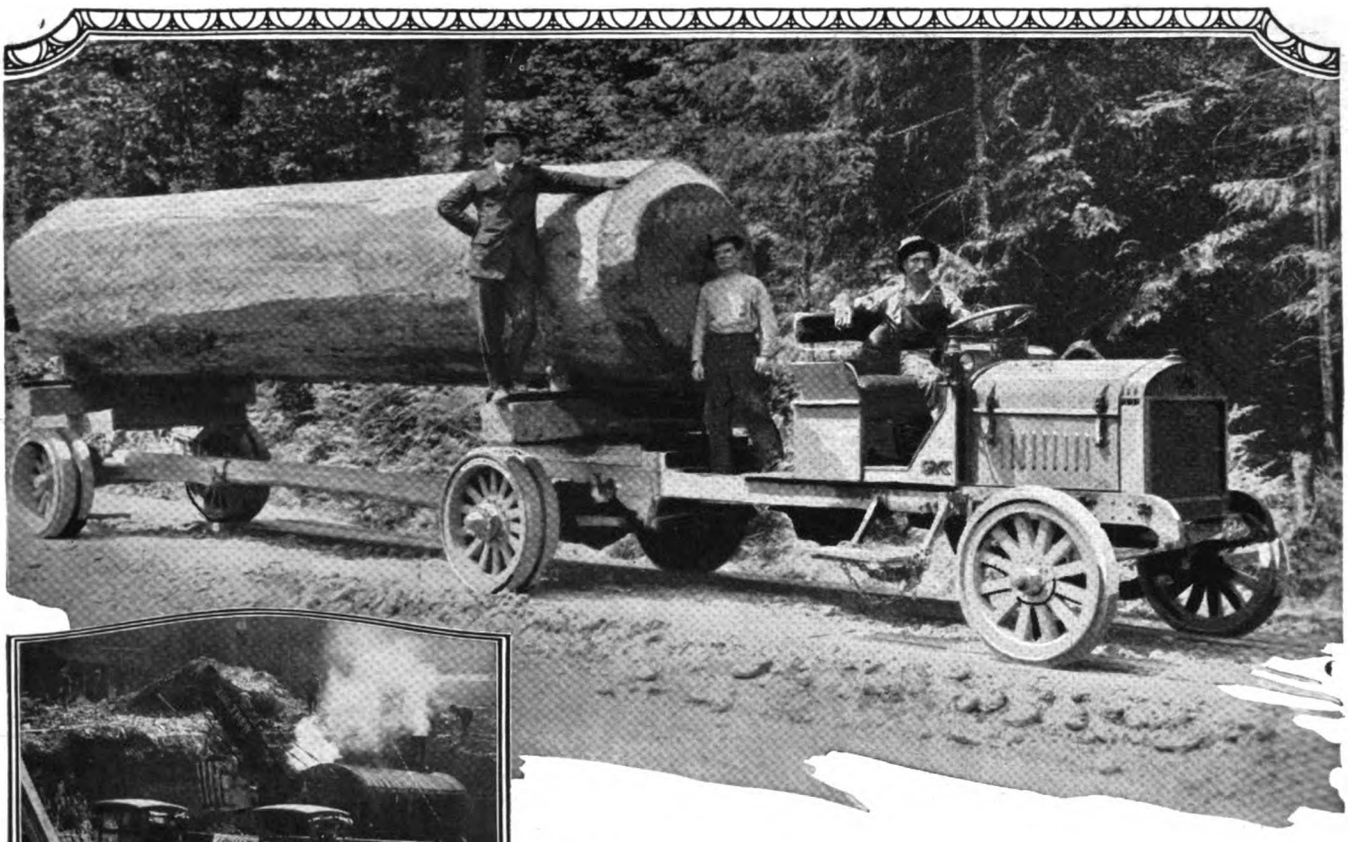

TO give a good account of itself in every day work a truck must be built with dependable parts.

The trucks illustrated—(they have Brown-Lipe-Chapin Differentials)—have stood up and taken the hard blows and long pulls of heavy hauling.

Differentials that withstand this unusual treatment without making their presence known can be relied upon to make light of ordinarily severe service.

BROWN-LIPE-CHAPIN
DIFFERENTIALS

BROWN-LIPE-GEAR
TRANSMISSIONS

Both at Syracuse N.Y.

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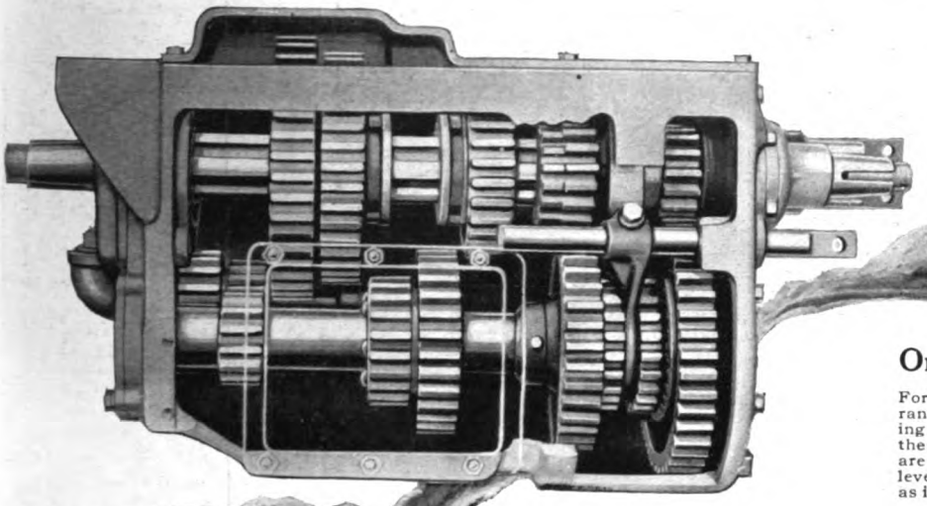
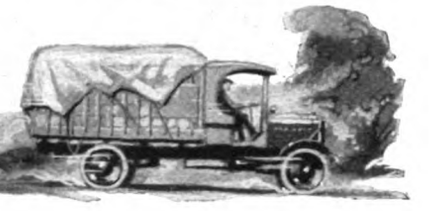
General Motors Trucks

GMC





One Range for *Speed*

For speed on good roads the high range is put into operation by shifting the range lever to connect with the smaller driving gears. Both ranges are controlled by the same gear shift lever and the various speeds are used as in any other transmission.

The GMC 2-Range Transmission

Developed from the experience and knowledge of years of truck building, the new GMC 2-Range transmission solves the greatest problem of heavy duty motor trucking.

It enables GMC trucks to carry their loads at the maximum speed consistent with their size without racing the engine and at a cost that is well within the demands of successful and profitable motor trucking.

It gives to these same trucks the much needed extra pulling power for bad roads, mud, soft ground and steep grades without speeding the engine.

The GMC 2-Range transmission is just what its name suggests. A simple transmission, following the most accepted points of transmission design and no different from a regular four speed selective type transmission except that there are two instead of one pair of constant mesh gears, giving the counter shaft two different speeds.

By connecting either of these sets, the power is transmitted through a high, good road driving range, or through a low and power developing range for heavy going. Motor truck operation has determined that 96 per cent of all motor trucking is done in high gear and only four per cent demands low gears.

The GMC 2-Range transmission makes possible an economical operation of a motor truck 96 per cent of this running time without sacrificing one bit of the necessary power for the four per cent of its operation that demands super-pulling ability.

Tests have established fully that this transmission permits thirty per cent more speed in high range and a similiar per cent of pulling power in low range, over and above that possible for the same sized engine and a regular type transmission.

And the 2-Range transmission is simple—only five more major parts than the usual type. It is easy to operate and has no complicated mechanical features. This new transmission is standard on GMC models of two ton capacity and greater.

The acceptability of all the superior features of GMC construction to truck users is still further increased by the substantial price reductions recently effective on all models, which place them at the front in present day motor truck values.

One Range for *Power*

By simply shifting the range lever and connecting with the larger driving gears, 30% more pulling power is given the truck. This low range as well as the high range has four forward speeds, high speed remaining a direct drive.

Here Are Six Other Features of Vital Importance to the Truck Owner

1. ***Removable Cylinder Sleeves*** —prevent cylinders from getting "out of round"—easily replaced if ever necessary.
2. ***Removable Valve Lifter Assembly***—easy of access, easy to adjust, easy to replace and keep always in perfect condition.
3. ***Dual Cooling***—cool water continually circulates around firing chambers—warmer water surrounds all vaporization points.
4. ***Super Heated Carburetion*** —gives greater power from present day heavy fuels and makes every drop of gas do more work.
5. ***Fly Ball Governor***—governs instantly and positively to correct speed which helps prolong the life of every GMC.
6. ***Pressure Lubrication***—this system is positive, simple and at the same time insures a wealth of oil upon all surfaces constantly.

GENERAL MOTORS TRUCK COMPANY

Division of General Motors Corporation

PONTIAC, MICH.

Branches and distributors in principal cities

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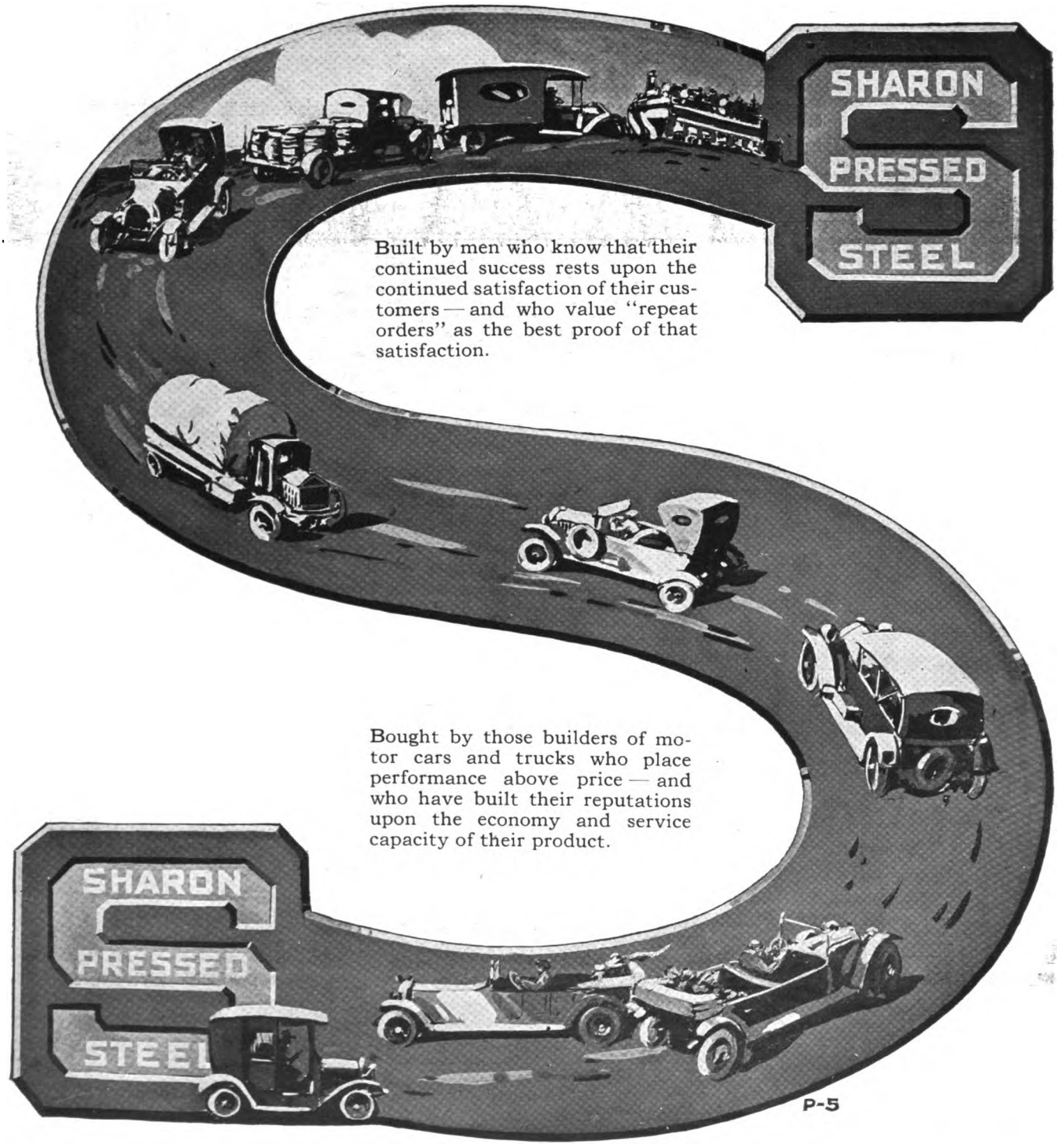
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Built by men who know that their continued success rests upon the continued satisfaction of their customers — and who value "repeat orders" as the best proof of that satisfaction.
Bought by those builders of motor cars and trucks who place performance above price — and who have built their reputations upon the economy and service capacity of their product.
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New York, 66 Broadway **Detroit, Dime Bank Bldg.**

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One of the Greatest Opportunities for 1922

Dealers will find it decidedly interesting to make a study of the present position of **International Motor Trucks.** Factors like the following point the way to probabilities for 1922:

—the setting of production records during the past year **(among all trucks and in a most difficult year);** last fall International production was causing general comment in the industry.

—the steady growth of International truck sales to a position among the few leaders.

—the phenomenal popularity of Internationals in all lines of business.

—the backing of International Service, which has been developed to a degree of usefulness **absolutely unequalled.**

The Line of Internationals, ranging up from the 1,500-lb. Speed Truck to the 10,000-lb. heavy-duty unit, comprise eleven sizes at prices which enable the dealer to offer **all prospects** the maximum in hauling investment. Many dealers have found in the **International Motor Truck** contract the road to profitable, substantial success. May we send you further details? Write to the Chicago office.

International Harvester Company of America

(INCORPORATED)

CHICAGO U S A

Branch Houses in 92 Principal Cities

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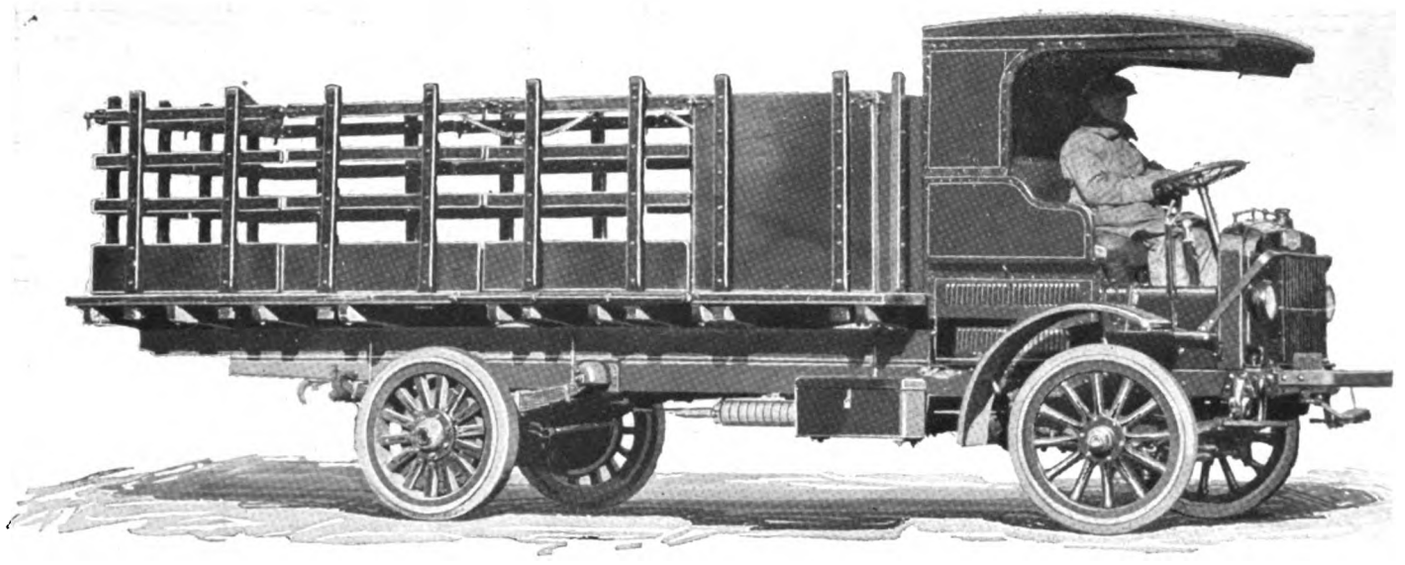

The New 2 ton Heavy Duty Autocar has the same outstanding characteristics as the 5 ton Heavy Duty Autocar which has proved so phenomenally economical.

DISTINCTIVE FEATURES	ECONOMIES EFFECTED				
	Lower Gas Consumption	Lower Oil Consumption	Lower Cost of Maintenance	More Continuous Operation	Economy of Space in Traffic and Garage
Light Chassis Weight	✓	✓	✓		
Short Wheelbase					✓
Even Load Distribution			✓	✓	
Perfectly Balanced Motor Counterbalanced Crankshaft	✓	✓	✓		
Crankshaft Mounted on Ball Bearings		✓	✓		
Removable System of Bushings			✓	✓	
Double Reduction Rear Axle	✓		✓	✓	
Factory Branch Service			✓	✓	

Standard 1½-2 ton Autocar
2 cylinder motor
Overall capacity . . . 11,000 lbs.
(Chassis, body and load)
Type F, 97-in. wheelbase chassis . **$1950**
Unladen Chassis weight, 3600 lbs.
Type G, 120-in. wheelbase chassis . **$2050**
Unladen Chassis weight, 3700 lbs.

New 2 ton Heavy Duty Autocar
4 cylinder motor
Overall capacity . . . 14,000 lbs.
(Chassis, body and load)
Type H, 114-in. wheelbase chassis . **$2950**
Unladen Chassis weight, 5200 lbs.
Type K, 138-in. wheelbase chassis . **$3075**
Unladen Chassis weight, 5350 lbs.

New 5 ton Heavy Duty Autocar
4 cylinder motor
Overall capacity . . . 22,000 lbs.
(Chassis, body and load)
Type Y, 120-in. wheelbase chassis . **$3950**
Unladen Chassis weight, 7200 lbs.
Type B, 156-in. wheelbase chassis . **$4100**
Unladen Chassis weight, 7400 lbs.

All prices F. O. B. Ardmore, Pa.

THE AUTOCAR COMPANY, Ardmore, Pa. (Established 1897)

Autocar

Wherever there's a road

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POWER WAGON

Vol. XXVIII. CHICAGO, FEBRUARY, 1922. No. 207

$90,000,000 Unit Made by Truck, Car and Parts Men

OTHER CONCERNS MAY JOIN LATER

For the best part of a year rumors of projected mergers among groups of motor vehicle and parts makers have been current in well-informed circles of the automotive industry, and within the past fortnight attempts directed toward the accomplishment of such group consolidation are said to have resulted in the formation of a $90,000,000 concern to be known as the Associated Motors Company. The merger, it is said, will embrace a number of manufacturers of motor trucks, passenger-cars and their principal parts, such as engines, axles, transmissions, and steering gears, etc., and will be headed by Robert V. Board, president of the Kentucky Wagon Manufacturing Company. Fourteen concerns, it is thought, are included in the new grouping, and others, both makers of vehicles and manufacturers of parts, may be taken in later.

Economy in production and reduction of overhead expenses are undoubtedly the motives back of the movement, and to this end it is possible that some of the factories involved in the consolidation may be devoted to the making of parts or to the production of certain brands of machines that prove to be more in demand than others. For the present at least, however, it is understood that the various brands represented will be continued, since it is apparently not the policy of the merging concerns to attempt to gain control of a preponderant share of the industry's total output as they are not now in the aggregate responsible for the bulk of either motor truck, passenger-car or parts production. Accordingly, it is believed that there will be no reduction of the number of producers or of the number of distributers and dealers as a result of the new amalgamation.

Most of the concerns said to be included in the merger are located in the middle west, and it is thought possible that this feature of the situation may point to an eventual program of production and sale based on restricted territorial lines. Such a policy would, of course, fit in with the desire to effect the maximum economies in production and distribution.

Fuel Tax Proposed

In his message to the General Assembly of Maryland, Governor Ritchie recommended the passage of a bill placing a tax of one cent a gallon on gasolene beginning June 22, 1922. Such a tax already has been approved by automobile interests in the city.

The tax would continue, according to the message, until a road deficit is wiped out, probably by January, 1923, when it would be reduced to the nominal figure of $1, provided the 2-cent tax would yield the necessary amount for road maintenance. If it would not, there would be a proportionate reduction in the registration fee.

Truck Makers Form Association

During the Chicago show motor truck makers formed a new association to further their interests. Under the name of the National Association of Motor Truck Industries the work formerly done by the Motor Truck Manufacturers' Association will, it is understood, be carried on. The interests of truck makers, parts makers, dealers and users will be fostered by the new body through a highly developed spirit of co-operation and a keen sense of what the industry needs at this time.

Third Quarter's Production

The National Automobile Chamber of Commerce has given out the following figures of truck production for the third quarter of last year:

Up to 1-ton	10,700
1-ton and under 2-ton	2,200
2-ton and under 3-ton	2,464
3-ton and under 4-ton	653
4-ton and under 5-ton	768
5-ton and over	874
Total	17,659

The total output of all truck factories for the third quarter was 37,482. In July the output was 10,761, in August 13,076 and in September 13,645.

New Truck Prices

The following changes in the prices of motor truck chassis have been announced since those published in the last issue of POWER WAGON:

Truck.	Old Price.	New Price.	Reduction.
Ford, 1-ton	$ 445	$ 430	$ 15
Gramm Pioneer, 1½-ton	2,050	1,900	150
Gramm Pioneer 2 -ton	3,175	2,925	250
Gramm Pioneer, 3½-ton	4,375	4,225	150
Gramm Pioneer, 5 -ton	5,275	4,895	380
Maxwell, 1½-ton	1,332	932	400
Selden, 1½-ton	2,360	2,250	110
Selden, 2 -ton	3,425	3,250	175
Selden, 3½-ton	4,175	3,750	425
Selden, 5 -ton	5,600	4,950	650
Stewart, ¾-ton	1,395	1,195	200
Stewart, 1 -ton	1,875	1,395	480
Stewart, 1½-ton	2,200	1,790	410
Stewart, 2 -ton	2,800	2,090	710
Stewart, 2½-ton	2,950	2,290	660
Stewart, 3½-ton	3,850	3,090	760
Transport, 1 -ton	1,395	1,295	100
Transport, 1½-ton	1,995	1,495	500
Transport, 3½-ton	3,885	2,585	1,300

Parts Makers Co-operate in Giving Owner Service

GREAT BENEFITS ARE ANTICIPATED

Growing out of the preliminary discussions of last March and April, a plan has been evolved for the merging of the service station facilities of several of the prominent parts makers and the system may now be said to be in regular operation. At that time there was much opposition to the prosposed handling of truck parts service through the parts makers' own stations, due to the fear, expressed by some truck makers, that the suggested method would tend to invite truck assembly by irresponsible individuals and concerns and that it would, if put into practice, divert from their dealers a very lucrative and substantial part of their business. Committees representing the truck makers and the parts makers were appointed last spring to investigate the problem from all angles and a series of conferences was arranged. The committee of parts makers has now announced the results of its labors in the perfecting of a system of unit service stations, which will carry complete stocks of Continental engines, Timken axles, Brown-Lipe transmissions, Borg & Beck clutches, Spicer universal joints and propeller-shafts, and other equally well-known units whose names will be given out later.

As one member of this committee expressed it, "service is the cornerstone of the automotive industry and adequate parts service is the mortar which holds this stone in place. A motor truck without national parts service is like a battleship without guns—a fine target for a competitor but with nothing to fight back.

One of the greatest obstacles to the healthy growth of the automotive industry has been the inability of the truck owner to enjoy uninterrupted service because the dealer was unable to obtain genuine parts immediately. Two of the most important reasons for this were the financial situation of the average dealer and the ever-increasing rate of dealer mortality. This plan of the unit manufacturers is built from the ground up. Acknowledging the importance of service, they have started at the beginning by putting parts distribution on a firm, permanent foundation, where it will, it is hoped, bring the greatest good to the greatest number. The parts service end of the plan assures the owner and buyer that

(*Continued on page* 14.)

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Dealers' Body Restricts Memberships Candidates

APPLICANTS TO BE WELL-ESTABLISHED

Future membership in the National Automobile Dealers' Association will be limited to those merchants who have been in business two years, who have first-class credit and financial rating and who carry not only the endorsement of their fellow dealers, but the confidence of their buyers. This, in effect, was the decision reached by the board of directors of the organization in the last quarterly meeting at headquarters at St. Louis.

Membership dues in the organization are to be changed from the payment of $10.00 per year to a grade of classification of $50.00 per annum as the lowest dues and $250.00 as the highest. The new regulations became effective January 1, 1922.

"The change is made to meet the economic condition" is the statement issued by the association and signed by the board of directors who authorized the change. "The chief support of the association in the past," the statement continues, "has been from the larger dealers and distributers of the country who have voluntarily contributed $100.00 per annum to the association's financing. The chief service demands have been made by the members who have contributed $10.00 per annum. The time has come to make the association mean something financially to the man who has contributed deeply to its support. To be so it must place its finances upon a larger basis in order to meet these larger expenditures needed to obtain larger benefits. The association has perfected a plan to render an individual service to individual members which will be more valuable to them than it costs. The association was organized largely to meet the political menaces which surrounded the industry. According to reports of association headquarters, these political considerations have largely been fulfilled, there being virtually no business of this kind now before the association for settlement. The need of the merchant of the future is something that will assist him economically, and future policies of the association will be adopted to meet this need. While not at liberty to announce the plan at present, the trade may confidently look forward to seeing the N. A. D. A. in a new and commanding field."

The board accepted the resignation of Harry D. Austin, of Seattle, director of the Pacific Northwest, and elected A. S. Eldridge of Seattle, the Buick distributer there, his successor.

Active membership in the association is now limited to persons or corporations, including factory branch managers regularly and actively engaged in the business of buying and selling and dealing in new passenger or commercial motor vehicles at a regularly established place of business within the United States. Corporations or partnerships admitted to active membership must designate someone from their organizations to represent them officially. No person, corporation or partnership engaged in the buying, selling or dealing in of new motor vehicles for a period of less than two years from the date of application for membership shall be elected.

No person, corporation or partnership will be elected to membership without giving satisfactory proof of honesty and integrity and reputation for fair dealing in his own community or such other information as may be asked for, and no application for membership shall be considered unless the applicant is recommended by a dealer already a member and endorsed by three members of the association. For dealers in towns of not less than 50,000 population and not more than 100,000 population the signature of two members of the association constitutes sufficient endorsement, in towns of less than 50,000 population signature of one member.

Every applicant must submit satisfactory proof that he holds a direct factory franchise or distributer's or other dealer's franchise, or that he is a factory branch manager and that he maintains a suitable and adequate salesroom, service station and parts replacement department.

Membership dues are assessed upon the basis of gross sales by the member during the calendar or fiscal year preceding the calendar year for which the dues are paid.

For members in cities of more than 50,000 population dues are based upon the following volume of gross sales:

Not to exceed $1,000,000...$100 per annum
Exceeding $1,000,000 but less than $1,500,000.....$150 per annum
Exceeding $1,500,000 but less than $2,000,000.....$200 per annum
Exceeding $2,000,000.....$250 per annum

For members in cities of less than 50,000 population dues are based upon the following volume of gross sales:

Not to exceed $1,000,000.....$50 per annum

Revision of Truck Weights

An increase in the minimum carload weights on trucks and passenger-cars shipped to Pacific Coast points is being contemplated by transcontinental railroads. The present minima on trucks shipped in 36-, 40- and 50-foot cars, respectively, are 12,500, 12,500 and 15,000 pounds. It is the plan to change these to 12,000, 13,440, and 19,440, respectively, with 14,000 pounds as the minimum to the North Coast. In this connection a hearing before the Transcontinental Freight Bureau in Chicago has been arranged by the Traffic Department of the National Automobile Chamber of Commerce for February 1.

Truck Business Better

The motor truck business of the Packard Motor Car Company of New York is showing marked improvement. Sales for the last three months of 1921 practically doubled 1920 sales for the corresponding period. December, 1921, sales show an increase of more than 100 per cent. over those of December, 1920. In the improvement in the truck business Packard officials see indications that general business is shaking off its pessimism and looking to the future confident that the period of depression has passed.

N. A. C. C. Urges Wider Adoption of Caution Plate

CAN NOT RECOMMEND RERATING PLAN

The Truck Standards Committee of the National Automobile Chamber of Commerce has recommended a more general use of the standard caution plate which has been adopted by the chamber. Fresh interest in the subject has been aroused by the recent proposal made by the road authorities of Connecticut to the effect that overloading of motor trucks would be allowed provided the maker of the truck involved would certify to the fact that the vehicle had a greater capacity than the factory rating would indicate. The committee's report says:

The Motor Truck Standards Committee has decided that the matter of re-rating the capacity of motor trucks to meet the requirements of those states which plan to enforce their law strictly upon the basis of the manufacturers' rated carrying capacity is one that varies with each individual manufacturer in each state, and indeed, with each individual truck, and is in reality a matter of sales policy with each individual manufacturer rather than a question of standard procedure which can be recommended by this committee.

We feel that it is beyond our province to recommend any such procedure and that the manufacturers' rated capacity is still the most practical basis for classifying motor truck chassis; that the standard caution plate of all motor truck chassis adopted by the National Automobile Chamber of Commerce in 1912 is probably more suitable for present requirements than any other form of plate that could be recommended at the present time. We feel that the present plate permits of furnishing all the weights required by manufacturer, user and motor vehicle commissioner.

We wish to recommend a more general use of this standard caution plate, not only that it should be attached to chassis, but that the space provided for weight should be actually filled in at the time that these weights are actually determined, and that the manufacturer should urge his agents and customers wherever possible to fill in these weights; that the manufacturer should recommend to the state motor vehicle commissioner that no license be issued for a motor vehicle unless the weights are properly filled in upon the caution plate at the time application is made.

We recommend that the motor truck members of the National Automobile Chamber of Commerce adopt these standards and the recommended practice of the Society of Automotive Engineers wherever applicable.

New Truck Rules Proposed

Regulation of weight, dimensions, loading and driving of trucks, with penalties for violations, is provided in a bill introduced in the New York State legislature by Senator Lowman. A similar bill, enacted last year, applied only to operation outside cities, whereas in the Lowman measure this exemption has been omitted. Pertinent provisions of the proposed law provide: maximum width, inclusive of load, 8 feet; maximum height from pavement to top of vehicle or load, 12 feet 6 inches; combined weight of truck and load or trailer and load must not exceed 28,000 pounds where vehicle has 4 wheels; weight of 4-wheel trucks must be distributed so that not more than 5,600 pounds rests on each wheel; maximum pressure per inch of tire width of any wheel, 800 pounds; speed limit, 20 miles per hour for 2-ton trucks and under, 15 miles per hour for heavier trucks—where equipped with pneumatic tires, 25 and 20 miles, respectively.

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Would Oust Street-Cars From New Yorks Streets

SYSTEM OF 3,500 'BUSES PROPOSED

Mayor Hylan of New York City has laid before the Board of Estimate a proposal for the scrapping of all the street-car lines in Manhattan and the substitution of 3,500 motor 'buses, which, it is estimated, could carry 2,240,000 passengers daily. The board has shown its attitude toward the plan by refusing to permit any further extensions of the existing elevated and surface-line transportation facilities and by expressing the opinion that future city transport of persons should be by subway and 'buses. The plan, as framed by Grover A. Whalen, commissioner of plants and structures, reads in part as follows:

"A comprehensive 'bus program has been worked out for the entire elimination in the Borough of Manhattan of the surface-car tracks and the substitution therefor of a 'bus system. In the Boroughs of Brooklyn, Bronx and Queens a 'bus system has also been worked out to augment the trolley-car system now in operation.

"In the Borough of Manhattan at the present time there are operating in the neighborhood of 1,060 trolley-cars. In the program outlined below we have planned to substitute a 'bus seat for every trolley seat now operating in the Borough of Manhattan.

"In order that this department may be properly equipped to meet its responsibilities to the public in the matter of passenger transportation, I respectfully recommend that corporate stock (revenue producing) be set aside in the amount of $25,000,000 for use as follows:

For the construction of 3,500 modern, well-built, sanitary, stable, safe and properly equipped motor 'buses, according to the plans perfected by the department	$19,250,000
For the purchase of spare parts and garage equipment	700,000
For the construction and equipment of a central motor 'bus repair shop	1,000,000
For the construction and equipment of garages	3,800,000
For contingencies	250,000
Total	$25,000,000

"While making this recommendation primarily in order to meet the transportation necessities of the public, and as a measure necessary to protect the vested interest of the people in the 5-cent fare, I am submitting this request also as a sound business proposition.

"From the experience of this department in motor 'bus operation and from a study of the transportation needs of the city, I believe that there is need for 200 'bus lines in the Boroughs of Manhattan, the Bronx, Brooklyn and Queens, conditions in Richmond making the trackless trolley system better suited to the needs of that borough.

"On these lines it is estimated that the traffic would average 2,240,000 passengers a day. These passengers, at 5 cents each, would pay $112,000 a day, or $40,880,000 a year. The fixed charges, including interest, depreciation and liability insurance, would amount to $9,089,000. The administration and maintenance cost would be $4,400,000, making the total fixed charges $13,489,000. The operating cost of an average of 3,200 'buses in service would be $23,360,000, making a total cost-fixed charges plus operation of $36,849,000, leaving a net revenue to the city amounting to $4,031,000.

"Although the initial appropriation made for this purpose on March 12, 1920, is not available for the service of the people, owing to the injunction obtained by a traction bondholder, it is not to be seriously believed that this impediment will remain indefinitely. Whether by reversal of the court ruling or by legislation, the city will no doubt come into the enjoyment of its fundamental right to serve the transportation needs of its people.

"It seems, therefore, that in scheduling the corporate stock funds to be set apart for public purposes it would be wise to make definite provisions for meeting this greatest of all civic needs—the need for adequate, safe and dependable passenger transportation. While the present obstruction is being dissolved in the crucible, the time may be well spent in perfecting plans, routing, organizing and preparing for the prompt installation of motor 'bus service on the 200 routes which will be required to provide proper surface transportation to supplement and feed the city's vast underground system of rapid transit and to afford communication in the outlying sections of the city where vacant lots and fields await the homebuilder while the homeseeker is forced to remain in congested areas for lack of such transportation."

Kelly Truck on Own Feet

Organization of its own sales force is now in course of procedure by the Kelly-Springfield Motor Truck Company, Springfield, Ohio, now that that company has divorced its connection with Hare's Motors. The sales personnel is about completed, according to General Manager E. O. McDonnell, a number of the branch managers and district representatives having lately been in Springfield in preparation for an intensive sales drive that is being planned.

Vim Situation Improves

Affairs of the Vim Motor Truck Company, Philadelphia, which were placed some months ago under the protection of interests allied with the Standard Steel Car Company, are said to have made progress toward an established footing. The Vim company is now operating practically as an independent unit, and its future is regarded as bright by those who have been in close touch with it.

During the past year South Carolina had 83,349 automobiles and 7,197 motor trucks, as compared with 93,843 automobiles and trucks in 1920, according to L. H. Thomas, secretary of the State Highway Commission.

Interstate Trucking Still Safe from Federal Control

I. C. C. NOT LIKELY TO INTERFERE

Proposals seeking the control of intercity trucking by the Interstate Commerce Commission came to naught when the railroads, through their chosen spokesmen, made it clear at a recent meeting of the Senate Committee on Interstate Commerce that the volume of freight handled by motor trucks between cities is but a small fraction of the total. It was the feeling of those present that it would not be advisable for Congress to interfere in the regulation of motor traffic at this time.

Bird M. Robertson, president of the American Short Line Railroad Association, told the committee that "motor trucks are rapidly invading the transportation field and duplicating the service rendered by the railroads, under conditions that are most unfair and unjust and are imposing a substantial burden upon the public. Trucks of that character in most of the states are permitted to compete as common carriers with existing railroads without paying anything for the road building or the up-keep and they are rapidly destroying the roads. In most of the states they are wholly unregulated, being permitted to operate without schedule and without any regulation as to their charges.

"We are of the opinion that there can not be any federal regulation," he continued. "We have investigated that matter and find that only 4 per cent. of their business is interstate; something more than 90 per cent. of their business is probably intrastate, and therefore it would be very difficult for the government to meet that situation.

"The railroads must not only build and maintain their own tracks, but are taxed heavily to create and maintain the highways used by the trucks; operate upon schedule, and are governed rigidly as to the charges they may make. Under these conditions the motor trucks underbid the railroads on the cream of the local business, though they are under no obligation to operate during bad weather. In this way they not only duplicate existing lines and service, but by decreasing the volume of traffic of the railroads they increase the cost of the service of the rail carriers.

"Some states have given their railroad commissions authority to regulate motor trucks, but in most of such states the commissions utterly fail to prevent the duplication of the service and fail to require them to compete upon a fair basis. If there be any duplicated railroads that do not render a real public purpose, they should be abandoned, and the commission has power to accomplish that result.

"I doubt the ability of the government to prevent a manufacturing enterprise from running its own motor trucks and rendering service. I refer exclusively, in my statement, to those doing business as common carriers."

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Increasing the Pay-Load

THE increasing stringency of legal weight limits is driving truck owners and designers to a consideration of ways in which the requirements of the law can be met without reducing the pay-load. In fact, there is a general desire to increase the pay-load, and in many cases, especially in fleet operation, there is a tendency toward the use of fewer and larger units for accomplishing that object.

Trailers of all kinds offer the most obvious method of meeting the legal demands of the various states, for, although the average rate of travel may be reduced, the pay-load is greatly increased without violating weight restrictions. And in this direction the use of semi-trailers seems to offer some additional advantages in the matter of speed and the facility of backing up to platforms and through narrow places. Possibilities somewhat more remote lie in the field of engineering design, in the reduction of unladen weight and the use of more wheels. The employment of pneumatic tires is indicated in some cases, such as Florida and Iowa, where greater loads are allowed when non-solid tires are used, and the higher speeds permissible with pneumatic equipment have practically the same effect by giving the vehicle a higher work capacity.

In view of the disadvantages under which heavy-duty trucks are placed by legislative restrictions, it is important that some way be found in which the economy and efficiency of the large unit can be maintained.

Second-Hand Trucks

A RECENT survey of the second-hand truck situation discloses such a variety of opinion as to the proper method of solvign the problem as to lead one almost to despair of ever attaining anything like unanimity of thought on the subject. Although the difficulties with which the situation is surrounded have become more harassing from year to year, culminating in a very grave state of affairs during the last year and a half, opinion seems to stand just about where it did seven or eight years ago, when the topic provoked much serious discussion at a meeting of truck makers in Detroit.

The views aired elsewhere in this issue indicate that much is still to be accomplished in arriving at a proper point of view from which the subject can be profitably debated. Until some agreement is reached on that basic matter, it will be rather futile to talk of method and procedure. The second-hand truck has so far had an evil influence on the trade; on that point we have heard no dissenting voice. But whether that influence is inescapable or avoidable remains to be determined, and on that point there is little agreement. Most discussion of the problem has been founded on the belief that the situation is unavoidable, and the remedies proposed have, therefore, sought to mitigate the evils of the situation rather than to eliminate the situation. Although we hazard no opinion as to the validity of the arguments offered pro and con, we do believe that the latter avenue of thought will bear some investigation.

In any event the subject can not be evaded by leaving its solution to the dealer. He is surrounded by innumerable and formidable difficulties, and his method of dealing with the problem of second-hand trucks will be dictated more often by the needs of the moment than by a sincere desire to protect his business future or the best interests of the industry as a whole. All his situations have a purely local significance to him, so it is not to be expected that he will evolve sound policies of national applicability nor must the responsibility for their discovery be laid at his door. The question of what to do with second-hand trucks must be settled by the manufacturers, always remembering that in the security of the dealer lies the stability of the industry at large.

Rumors of Merger

THE prospect of a merger of producing factors in the automotive industry, so long as it is effected in the interest of financial stability and industrial permanence, is one that can be viewed with equanimity by the entire trade. Even when the banks are thought or known to be the instigators of the movement there need be no occasion for alarm, since financiers are not to be supposed to be concerned in the wrecking of institutions or industries but, rather, in their upbuilding, having profit for their motive. A consolidation of manufacturers on the group plan which aims at a reduction of the number of producers is commendable, and if it seek still further conservation through a reduction of the number of distributing factors it should be welcomed by the conservative element of the industry.

The consolidation now so much talked of is but an indication of what may confidently be expected in this industry, and it will be only natural and, on the whole, desirable, if other groups should be urged to take similar steps for the purpose of putting production and sale on a safe and sound basis. Mergers of the right kind are not necessarily to be interpreted as signs of weakness, either individually or industrially, for they bring about shrinkage only where shrinkage is needed and, while seeming perhaps to shorten the fabric of industry, in fact strengthen it. Properly handled and properly motivated, they should make for a higher degree of economy, stability and permanence.

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Parts Makers' Service

(*Continued from Page 9.*)

he can keep his vehicle in uninterrupted service wherever automotive equipment is used.

"All truck manufacturers see the importance of building for the future. To do this every selling force must be brought to bear to produce repeat orders. The greatest selling force is satisfaction through past performance. The greatest satisfaction is through adequate, efficient service. Real service is possible only with genuine parts instantly available. Parts service then is a great selling force and one which it has not been possible to utilize in the past."

So reason the unit manufacturers responsible for this plan and around this ideal they have built a far-reaching organization. The plan divides the United States into 40 territories. The size of each territory has been determined in accordance with the population, vehicle registration, buying power, and the vehicle sales possibilities for the future. Each of these territories is to be serviced by what has been called a major parts depot. This is to serve as a central distributing point for the territory. Of the 40 stations planned, 35 are now in operation with the remaining 5 in process of development.

In each territory and under the jurisdiction of the major station is a series of substations. These distribute in a specified local territory. There will be from 6 to 10 substations under each major station. The location of each substation is such that immediate parts delivery will be possible in all important localities and a maximum 5-hour service possible in the less populated districts. It is estimated that there will be at least 325 substations distributing genuine parts in their respective territories.

A chain of stations suitably located will take care of the Canadian markets. Statistics accumulated by the unit manufacturers indicate that no other single cause has done more to limit the sale of "specialized" (that is, "assembled") trucks in Canada than lack of protection as a result of practically no parts service. The first stations to be established in Canada will be at Vancouver, Winnipeg, Toronto, and Montreal, with substations under each. Plans are already under way for establishing stations throughout the British Isles, Australia, Hawaii, Cuba, Mexico, the Netherlands, Norway, Sweden, Japan, India, and, in fact, every country where "specialized" vehicles are used.

This world-wide organization is to be devoted to the one fundamental task of promoting the sale of "specialized" cars and trucks. The policies under which these stations will operate are in the hands of a committee made up of representatives of the leading unit manufacturers.

Several of the most important results which the unit manufacturers claim for this plan are as follows:

(1) Immediate parts service in all territories of the United States and foreign countries where "specialized" vehicles are operated.

(2) Elimination of Pirate Parts.—It will make it unnecessary for the dealer to nullify the guarantee on his vehicle by selling his customers inferior parts made by other than the manufacturers of the original unit. This action on the dealer's part has been necessary in the past as he was not able to obtain genuine parts immediately. The stations carry only genuine parts, designed, produced and inspected by the specialists of the unit manufacturers' organizations.

(3) Lowering of Parts Prices.—Direct assistance will be given to manufacturers, dealers, small and large fleet owners and other users.

(4) Protection for truck manufacturers' service when territories are without representation.

(5) Elimination of investment by dealer, allowing him to use his working capital in the promotion of sales.

(6) Guaranteeing genuine parts, so that the dealer and owner of "specialized" vehicle can depend upon purchasing genuine material.—All parts are to be trademarked by the unit manufacturer producing them. This will provide a universal means of identification and a guarantee of protection and value.

As one member of the unit manufacturers' committee has put it, "the extent to which the plan succeeds will be directly proportioned to the extent to which it serves the automotive industry in general. It is a great step forward. Its basic ideal of unselfishness is alone sufficiently meritorious to warrant enthusiastic support. The plan is unique in that it is the first undertaking of its kind in the automotive industry." The policies under which the stations will operate are in the hands of a committee made up of one representative from each of the companies working under this plan.

The station managers are to represent the customers of the unit manufacturers in their respective territories in promoting the sale of "specialized" vehicles. Through the stations will be held sales conferences open to all dealers and salesmen selling vehicles equipped with units represented by the stations. There will also be conferences held in each station territory for instruction of the dealers' mechanics. Careful inspection of each major station and each substation will be made regularly by a factory representative, so that the high ideals and standards set for the stations will be maintained.

Continuous national trade-paper, newspaper, and direct advertising will be run by both unit manufacturers and stations directly promoting the sale of the "specialized" vehicle. The unit manufacturers outline many important results which their plans will accomplish—results which will have a far-reaching effect on the automotive industry.

The following stations are now in operation:

Atlanta, Motor Parts Corp.; *Baltimore*, Quaker City Motor Parts Co.; *Boston*, Campbell Motors Corp.; *Buffalo*, Units Parts Corp.; *Charleston, S. C.*, Carolina Motor Parts Co.; *Chicago*, Standard Unit Parts Corp.; *Cleveland*, Automotive Parts Co.; *Columbus*, Automotive Parts Co.; *Cincinnati*, Automotive Parts Co.; *Dallas*, Motor Parts Depot; *Denver*, Gall Auto Specialty Co.; *Des Moines*, Standard Motor Parts Co.; *Detroit*, Automotive Parts Co.; *Harrisburg, Pa.*, Quaker City Motor Parts Co.; *Indianapolis*, Central Motor Parts Co.; *Kansas City*, General Auto Parts Co.; *Louisville*, Edigen Motor Parts Co.; *Los Angeles*, Colyear Motor Sales Co.; *Memphis*, company's title not chosen; *Milwaukee*, Standard Unit Parts Corp.; *Minneapolis*, Baldwin Service Co.; *New York*, Chadick Delamater Corp.; *New Orleans*, Standard Motor Parts, Inc.; *Omaha*, Omaha Motor Parts Co.; *Philadelphia*, Quaker City Motor Parts Co.; *Pittsburgh*, Superior Motor Parts Co.; *Portland, Ore.*, Colyear Motor Sales Co.; *Richmond*, Standard Parts Co.; *Salt Lake City*, Mendenhall Auto Parts Co.; *San Francisco*, Colyear Motor Sales Co.; *Seattle*, Colyear Motor Sales Co.; *St. Louis*, Authorized Motor Parts Co.; *Spokane*, Colyear Motor Sales Co.; *Toledo*, Automotive Parts Co.

Each of the unit parts depots, it is said, will be financed by local capital entirely and will be operated according to conditions existing in the different cities. Contracts have been signed for handling the distribution of the unit makers' products, and in turn they will sign sub-dealers who will handle the unit parts in the smaller cities of the 40 districts.

These contracts in the main only require that the station maintain an adequate supply of parts at all times, the supply to be based on the population served and the total registry of cars in the districts. Prices are set by the factories, freight variations causing any difference that may exist in prices in any section.

The business of signing distribution agencies in the smaller cities will be carried through during the early months of the year, and by April, factory parts will be available in any section of the country in five to six hours.

Pietsch With Kelly Truck

Frank Pietsch of Chicago has been appointed sales manager of the Kelly-Springfield Motor Truck Company of Springfield, Ohio, and has already taken charge of the new sales organization. Mr. Pietsch was formerly manager of the national truck division of the Packard company, with headquarters at Detroit. He was also at one time manager of the White company's branch in Chicago. Grayson F. Lathrop has been appointed assistant sales manager and R. B. Fuller as national accounts representative in the East, with headquarters at 120 Broadway, New York. Mr. Lathrop has been identified with the Kelly organization for seven years. Mr. Fuller was formerly in charge of the West Indies export business of the Armours.

Hare's May Take Traylor

If negotiations which now are pending are successful, Hare's Motors will take over the sale of the line of trucks made by the Traylor Engineering & Manufacturing Company of Cornwallis, Pennsylvania. Final details of the contract have not been worked out, but it is expected the plan will go through successfully in the near future.

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Motor Industry Is Large Gainer Through Standards

PRODUCTION COSTS GREATLY REDUCED

For years the National Automobile Chamber of Commerce has co-operated with the Society of Automotive Engineers in the latter's standardization work to the ultimate advantage of the industry as a whole. This work has brought some three hundred S. A. E. standards in motor car and truck construction, the last thirty of which were being considered at the meeting of the S. A. E. Standards Committee in New York on January 10th.

The following are among the points brought out by the S. A. E.

(1) Quantity production has been the greatest single factor in the great decrease during the last 10 years in production cost per vehicle, measured in the purchasing power of labor, a decrease of 56 per cent.

(2) Quantity production has, however, reached the period of "diminishing returns"; its further application can not be expected to result during the next 10 years in a much greater reduction in cost per vehicle.

(3) The full benefits of standardization can not be had, however, without the full understanding and the active support of the executives of the industry.

(4) A proper system of standardization reduces the cost and enhances the quality of production and does not stifle design.

(5) In 1909 there were less than 10 standards; in 1921 there were over 300.

(6) Over 2,400 sizes of parts and material specifications have been approved.

(7) Ball-bearing and electrical-equipment manufacturers say S. A. E. standards have cut their production costs over 30 per cent.

(8) Standardization reduced steel analyses from 135 to 47, lens sizes from 88 to 4, and radiator-cap types and sizes from 58 to 15.

(9) Engine and steel manufacturers say S. A. E. steel standards have cut their production costs over 20 per cent.

(10) The cost of gages was reduced 66 per cent by standardization.

Hearses Classed as Trucks

Motor hearses used in Connecticut are, under the revised state motor vehicle statutes, classified as trucks and, being available for hire, must be registered as public service motor vehicles. Because of the former classification, they must bear plates indicating their rated capacity. Funeral directors of the state express indignation over interpretations of the statute in question and have appealed Motor Vehicle Commissioner Robbins B. Stoeckel, following a conference with Attorney General Frank E. Healy, has notified the Connecticut Undertakers Association that he is powerless to change this classification and suggests that an amendment be proposed at the next legislative session, if a change is desired.

Advocate 20-Foot Roads

Adoption of a 20-foot standard minimum width for all trunk highways throughout the country was endorsed unanimously at the thirteenth American Good Roads Congress which closed its sessions in Chicago recently. In addition to declaring itself strongly in favor of the 20-foot standard width as a minmum for all trunk highways, various other measures were acted upon. Among those resolutions upon which the body placed its stamp of approval were the following: petitioning the Interstate Commerce Commission to reduce freight rates on road-building material; recommending the removal of interurban tracks from public highways; prohibiting advertising signboards on public highways; indorsing the principle of federal aid to states in highway financing; indorsing the Woodruff bill now before congress, asking for $100,000,000 for federal aid purposes in highway construction for each year for five years beginning July 1, 1922; petitioning congress to extend the principles of federal aid to the territory of Alaska, forest areas and Indian reservations; petitioning President Harding to take necessary steps to make the government of the United States a member of the International Road Congress meeting at Madrid, Spain, in 1925; condemning the use of country highways as speedways and asking for better highway police protection and regulation in country districts, and decrying the interference of politics in state road programs.

The closest co-operation between all parties interested in the construction of modern roads was urged by William Ord, of Cleveland, manager of the Lakewood Engineering Company, and D. C. Fenner, of the public works department, International Motor Company, New York, laid particular stress upon the importance of uniform legislation affecting highway traffic and transport.

The financial viewpoint of road-building problems was debated. The experiences of the State of Minnesota in highway financing were related by Commissioner C. M. Babcock, of the highway department, and A. R. Hirst, chief highway engineer, Wisconsin highway commission, gave a synopsis of the proposed Wisconsin plan of highway finance.

Ford's 1921 Output

American Ford plants in 1921 turned out 928,750 cars and trucks—Canadian plants 42,348, and foreign plants 42,860—a total of 1,013,958. Tractor production totaled 36,782.

August, with a production of 118,100 cars and trucks, was the largest month in company's history. The largest single day was July 14 when 4,461 cars and trucks were built.

The Kearny, New Jersey, plant assembled 93,409 cars and trucks, establishing a record. Detroit was second with some 4,000 less. The past year exceeded by 104,000 the record for retail sales of cars and trucks in the United States. Production, however, for American and foreign plants was some 14,000 behind 1920, the difference representing vehicles on hand at the first of year 1920 but sold during 1921.

White Announces Special Chassis for 'Bus Service

LONG SPRINGS AND LONG WHEEL-BASE

A special type of motor 'bus chassis, having new features of design which are important in passenger transportation but not available in the conventional types of truck chassis, has been brought out by the White Company of Cleveland. The new design is one of the first in which both chassis and body have been developed especially for 'bus work. It gives railway companies and 'bus operators the advantage of using equipment that exactly fits the requirements of 'bus transportation.

Regular models of motor trucks have been successful in 'bus service, but the rapid development of passenger transportation by motor 'buses and the use of the 'bus in new classes of service, have brought out many new operating problems which are thought to be met best by special design.

The new model has a wheel-base of 198 inches, making it possible to mount, without excessive overhang, a body which has comfortable seats for 25 passengers. Long and flexible springs, a low center of gravity and the long wheel-base, combine to make riding easy. Because of its low loading height, only one step is needed at the entrance. Passengers can enter or leave rapidly, so that stops are short and fast schedules can be maintained.

Two types of bodies have been designed for the 'bus chassis—one known as a city type, and the other an interurban type. Operating companies, however, may use other types of bodies when desired. The city type permits of great freedom of movement about the interior and eliminates "choking" at the entrance. The interurban type is designed for the utmost comfort of passengers on long trips with ample space for luggage. Both types have wide double doors at the front and an emergency door in the rear. Modern heating and ventilating systems are installed.

Standard equipment includes generator and electric lights, side braces on the frame, steel wheels and solid tires, single in the front and dual in the rear. This tire equipment is especially adapted to operation on city streets. Pneumatic tires and disk steel wheels can be furnished, if desired for interurban operation. This tire equipment does not raise the low center of gravity or increase the frame height. The use of various optional standard gear-ratios makes possible a wide range of speed and acceleration.

A total of 48,523 motor vehicles were licensed in Utah in 1921. The truck licenses numbered 6,936. The total shows a gain of 5,819 over 1920. The increase is considered entirely satisfactory, inasmuch as the population of the state does not exceed 450,000 and in view of the fact that the mining industry, especially copper, wool-growing, stock-raising and the sugar-beet business, which are the mainstays of the inter-mountain region, have not yet recovered from the depression.

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Group Organization of the M. & A. M. A. Started

HARGRAVE A. LONG MADE MANAGER

Hargrave A. Long has been appointed manager of the Group Department of the Motor & Accessory Manufacturers' Association. This new division was created January 1 in accordance with the policy of the association's board of directors to organize the four hundred affiliated companies along more specialized group lines. Tentative plans have been projected for commodity divisions representing the principal parts and units in the automotive field.

Before joining the executive staff of the association, Mr. Long was secretary and treasurer of the Automotive Wood Wheel Manufacturers' Association, which has now become the Wood Wheel Group of the national organization. From 1917 to 1919 Mr. Long was secretary of the Wheel Manufacturers' War Service Committee, also secretary of the Hickory Products Association since 1915.

Three groups of the Motor & Accessory Manufacturers' Association are already in operation—the Leaf Spring Group, the Sheet Metal Group and the Wood Wheel Group. Present members of the association and new concerns, as they are eligible to membership, will be assigned to groups according to the product which they manufacture for the automotive industry. All concerns making the same unit or commodity will constitute a special group, thus extending the scope of the association's services and enabling it to meet more fully the specialized needs of the various classes of its membership.

According to the association's general manager, M. L. Heminway, the group plan will "make for a greater unity of purpose in the direction of economics of production and distribution, thus eliminating duplication of effort and expense." It is believed that, under this plan, the industry and the public will both be materially benefited. The principal activities and functions of these groups may thus be summarized:

(1) Discussion of subjects of interest and value to the particular division or branch of the industry in which the members of the group are engaged.

(2) The advancement and improvement of the entire industry and the particular division thereof represented by the members of the group.

(3) The collection and dissemination of statistics and information of value to the members of the group.

(4) Such standardization of mechanical equipment, production methods, and commercial practices as may be deemed desirable or essential to advance the interests of the particular branch of the industry represented by the group, working in cooperation with the Society of Automotive Engineers.

(5) Other activities not specifically named herein, if approved by the board of directors, upon written request presented by the chairman of a particular group.

(6) All the above activities are to be carried on within the limitations imposed by the federal and state laws, and under the advice and guidance of the general council of the association.

The following preliminary classification of contemplated groups is announced:

1. Asbestos Products.
2. Axles.
3. Bearings.
4. Bumpers.
5. Carbureters.
6. Chains.
7. Clutches.
8. Engines.
9. Fans.
10. Forgings.
11. Foundry Products.
12. Gears.
13. Headlight Devices.
14. Piston Rings.
15. Radiators.
16. Sheet and Pressed Metals.
17. Shock Absorbers.
18. Spark Plugs.
19. Springs.
20. Starting, Lighting and Ignition Equipment.
21. Steel.
22. Steel Products.
23. Tops.
24. Transmissions.
25. Warning Signals.
26. Wheels.
27. Windshields.

Booklet for Road-Builders

Highway contractors and those who are interested in selling motor trucks to them will be interested in a revised edition of the Autocar Company's booklet on highway construction which has just been issued. In its 16 pages it presents a variety of most interesting pictures, showing Autocar trucks at work in road-building service, and summarizes in pithy style a statement of the kind of work being performed by them.

Evidence of Ownership

John M. Bennett has invented a new form of title, combining the qualities of an abstract of title and a certificate of guaranty, which can be carried with a motor truck or car wherever it goes. By means of the new instrument proof of ownership can always be available. The National Auto Abstract & Title Company of Detroit, Washington and Lincoln, Nebraska, has been formed to exploit the idea.

Trucks Gain in Oregon

Latest registration figures for the State of Oregon show a gain of 14 per cent. in the number of automobiles since the first of 1921 and a gain of 15 per cent. in trucks. On January 1, 1921, there were 103,414 automobiles, while at the present time there are 118,169, a gain of 14,755. Trucks at the beginning of last year numbered 12,856, while they now number 14,747, an increase of 1,889.

Truck Transportation Is Inevitable in New York

CONGESTION WILL NOT BE TOLERATED

The electrification of the Manhattan area of the Port of New York District, and the installation of an automatic electric railroad system to serve all railroads at trunk line terminals away from the waterfront was stressed as the only solution of the port problems in an address by Major Elihu C. Church of the Port of New York Authority at a meeting of 200 electrical transportation engineers which was held on January 13, under the auspices of the Automobile Bureau of the New York Edison Company.

"Railroads must not clutter our waterfronts higgelty piggelty the way they do," declared Major Church in part. "It is essential that docking space, with efficient loading and unloading railroad facilities be afforded all vessels entering the Port of New York. This will be brought about by a system of trunk belt-lines adjacent to the port district, served by an automatic electric railroad system within the immediate waterfront area."

In speaking of clearing railroad and street traffic congestion in Manhattan and the Bronx and the other boroughs of the city, Major Church praised the electric truck. He avowed that the immediate future would see the development of truck trunk-line highways for the fleets of transports that have to travel in the city. "These trunk-line highways," declared the speaker, "are as essential to the life of the city, its commerce and welfare, as the arteries are to human life. Trucks can not average more than 2½ miles an hour downtown in New York. Their progress is marked by halts. They must have the right-of-way as much as the 7.52 commuter's train in the morning."

E. E. La Schum of the American Railway Express Company spoke on electric trucks in the service of his company. Referring to the remark made by Major Church that 12,000 tons of perishable foodstuffs are handled daily in New York City, Mr. La Schum stated that it was his belief that "no other agencies or methods of transportation, available at the present day, would prove more useful in reducing delays in the shipment of this material than electric trucks." He also expressed himself as of the opinion that "at least 85 per cent. of all the trucking done in New York City will eventually be done by trucks and that this would be brought about, not so much by the sales efforts of manufacturers or advertising agencies, as by the strong economic pressure that the New York business man must undergo until a proper solution of New York's trucking problem has been settled upon. This solution is to be found in the truck."

Registration of motor vehicles in Pennsylvania during 1921 broke all records. A comparison of license registration figures follows: In 1921—Passenger-cars, 632,541; motor trucks, 57,048; motorcycles, 21,111. In 1920—Passenger-cars, 521,835; motor trucks, 48,329; motor cycles, 23,981.

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Where the Motor 'Bus Can Succeed

By WALTER JACKSON

THERE were 47,941 miles of electric railway single trackage in the United States in 1919. In 1920 the mileage showed a decrease for the first time in the history of the industry, being 47,705 miles or a loss of 236 miles. The figures for 1921 may show a still greater loss. These declines are due to the deliberate abandonment of non-paying lines, principally of systems in receivership that are not compelled to continue to observe original franchise stipulations.

In cities so large as Bridgeport, Connecticut, and Des Moines, Iowa, we have seen extended periods of idleness on the part of the local traction systems. In the one case it was the hope of the traction company to compel the absolute elimination of "jitney" competition; in the other there was a desperate effort to secure a higher rate of fare. Like scenes are being enacted in other cities. One would not expect sane communities to prefer to exchange even a fairly reliable street-railway under one corporate management for the uncertain, hard-to-please but far from coy "jitney" man. Yet they have shown themselves willing to put up with atrocious "jitney" operation for weeks and months rather than submit to the demands of the street-railway. In short, the lack of good-will toward the electric railway blinds the community to settling its transportation problem upon the common-sense basis of all mass transportation in a community, regardless of the manner of propulsion, being under a central, coördinated management. So far some electric-railway companies have not seen their opportunity to absorb unto themselves whatever special advantages the 'bus has for attracting traffic and reducing the operating costs of certain classes of service. They have actually given the impression by their antagonistic attitude that the field of the motor omnibus is greater than it really is on the basis of present-day development, and they are encouraging the formation of motor 'bus companies whose promoters seem very much in the dark as to the requirements of an exacting public.

It is significant that, while no important city has given up its railway system to change the "jitney" 'bus, the substitution of motor 'buses for the cross-country trolley-car seems to be meeting with public favor. This class of trolley line usually has a single track, which handicaps its schedules; and, as most of its former patrons own motor cars, the clientele tends to decrease year by year. Besides, the very advent of improved roads is a ban to this class of trolley in another direction, namely, that of realignment to new paving levels. Few such railways can afford to get out of the dirt and into the paving; so, they quit. The abandonment of several hundred miles of track by the Eastern Massachusetts Street Railway Company alone is a forerunner of what other railways with cross-country lines on public highways are facing.

The development of both electric and steam railways in this country has been on such a grandiose scale that one would hardly expect to find any community of considerable size without transportation service. Nevertheless, there has been already an imposing development of motor 'bus transportation in non-competitive districts. Out of a city like Poughkeepsie, New York, for example, a number of individually owned motor 'bus enterprises are operated which tap territory without railway service of any kind. There are literally thousands of 1-man services of this kind that are performing a most valuable function. They produce a living for men who are willing to work 12 to 16 hours per day, but would not do for companies from whom the community would demand better vehicles and more frequent service. There must be some deep-rooted belief that individuals in the public-transportation field are deserving fellows entitled to "get away" with anything; whereas, company organization at once implies that there are great profits for somebody somewhere, this implication meaning higher standards and higher taxes.

So far as "jitney" operation is concerned, that is here to-day, gone to-morrow and back again day after to-morrow. Endless state and municipal measures have been passed at the behest of both the railways and the public and, I may add, even at the behest of "jitney" men who have achieved the status of a vested interest and want protection against later comers. But much of this legislation seems to fall to the ground whenever the local street-railway company and the administration disagree. One day sees all the second-hand cars in town soliciting patronage, usually at a lower fare. The news travels and a hegira sets in toward the new "jitney" Medina. Thus, in the recent Des Moines trouble "jitneys" thrown out of Connecticut actually were driven overland to Iowa to obtain their share of the abnormal patronage.

It has been more difficult to regulate the competitive overland motor 'bus than the city vehicle. The exclusive franchises that electric railways lean upon in municipalities do not apply to the country, where the electric railway may be a blend of city, highway and right-of-way operation. Often enough the 'buses do not parallel the railway all the way but only in part. If they reach, in addition, off-side districts not served by the railway, it is hard for a state commission to say whether the proposed 'bus route is entitled to a certificate of convenience and necessity. Most of the overland 'bus companies, those in California and Washington, for example, charge lower fares than the railways, but the chief reason for their getting the business seems to be that they come closer to the patrons' origin and destination than the railways. In California the delights of the climate are a temptation to outdoor riding.

As already hinted, the only curb on these cross-country or overland 'bus operators is that they must, in a growing number of states like Connecticut, New York, Pennsylvania, Illinois, New Jersey, California and Washington, obtain certificates of convenience and necessity. This curb is of varying degrees of value, dependent upon the viewpoint of the commission. In one case the Illinois commission granted a certificate permitting competition against an electric railway because the latter had not met the commission's ideas of a proper standard of service; but the same commission refused a certificate to another applicant who wanted to compete with an electric railway giving satisfactory service. Commissions are inclined to give certificates in cases where a large part of the run will not be in competitive territory and in competitive territory they may grant operating rights because of the lower fare offered.

The latest motor 'bus legislation in which both city and country operation are placed under the state commission is that of Connecticut and of New Jersey. In the latter state, however, the commission exercises no control over operators who had regular routes before the time of the passage of the act, March 15, 1921. The question now before the courts is whether this exception constitutes a vested or property right that can be transferred to a successor. In the first case brought up the Board of Public Utility Commissioners granted this succession right to one Carl A. Becker, but the Public Service Railway Company within whose area Becker operates has appealed the case. The point made by the commissioners was that the 'bus operators active at the time of the act had been regulated already as to number and routes by the local municipalities, and that they were therefore, presumably, fulfilling a work of convenience and necessity. Under their conception of the law entirely new petitioners can apply to them for routes, provided they have obtained approval previously from the local governments.

The cities of Connecticut never undertook to license public-utility vehicles so the new legislation did not deprive them of any powers theretofore exercised. All that a "jitney" operator needed was the nominal state license for a public-utility vehicle, and all the regulation he endured was what the police chose to exact, as was evident particularly at Bridgeport. Theoretically, the Connecticut Public Utilities Commission is not obliged to pay much attention to what the different cities may desire, but practically it is under this obligation. In the city of Hartford, for example, the elimination of the "jitney" met with general approval. Contrariwise, the large working population of Bridgeport was bitterly opposed to paying a 10-cent fare on the cars in view of the fact that it had hitherto had a 5-cent fare on the 'buses. Preceding the passage of the state law, the Bridgeport council had agreed to relegate the 'buses to streets on which there were no car tracks, so far as that was physically possible. Despite

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this handicap the 'buses continued to get most of the traffic. When the state commission endeavored to put these machines out of business, the latter adopted one subterfuge after another, such as accepting tickets from alleged club-members, besides securing stays from the courts. The commission itself, recognizing the hardship of a 10-cent fare, has ordered lately a 5-cent short-ride fare and threatened to grant additional 'bus licenses, if the electric railway does not give satisfactory rates and service.

I have gone into these situations at some length to indicate that, while the regulatory bodies are gradually assuming control of motor 'bus operation, it does not follow that the electric railways can afford to show indifference to the public. The people will find some way of getting what they want, sooner or later. It seems incredible that the electric railways themselves have been among the opponents of legislation that would grant the common carrier under discussion the right to run motor 'buses. They actually feared that such recognition of the transportation usefulness of the motor 'bus would make all their own precious investments passé. This was topsy-turvy reasoning. The 'bus did not need this legislation to prove what it can do. Thus far not more than a score or so of our 800 to 900 operating railway companies have undertaken motor 'bus operation, but even these few pioneers give a clue to some of the valuable results that can be attained with the motor 'bus. One large city railway company has installed 'buses over a poorly traveled route to save the expense of retracking and repaving, another has given up a dangerous run along a steep river bank to follow a shorter line on the highway; a third has cut down the losses on a roundabout electric railway by offering a shorter, faster alternative 'bus route; a fourth has found that a 'bus line makes it unnecessary to disturb a cherished public park; a fifth finds the 'bus the least costly medium for tying together two important rail routes; a sixth has made one loop out of two former trackways; and several others have found the 'bus desirable to ward off the cost of track extensions until new business justifies the old burdens.

Summarizing the present situation as to the motor 'bus, we have the unreliable competitive "jitney"; the rapidly growing cross-country 'bus, sometimes competitive and sometimes creative; the beginnings of motor 'bus operation by electric railways; the de luxe double-decker; and, finally, the "on call" motor 'buses and chars-a-bancs.

Will the city and suburban electric railway disappear altogether and the steam railroad be discontinued in part; or will the increase in motor 'buses be due more to the creation of new business because of their unlimited flexibility? The general public, unfamiliar with the cost of either mode of propulsion, can not be blamed for thinking that the trolley-car is doomed when it observes the "jitney" charging half the fare and making 50 per cent. greater speed; but the automotive engineer can be blamed, if he fails to see that these two forms of transportation are not compared so easily as that.

The electric railway of to-day is the product of two generations of corporate life. During those generations it has accummulated a number of unwholesome factors that place it at a disadvantage in competition, entirely aside from the question of engineering merit. There is, for example, the fundamental franchise obligation that a certain amount of service must be given regardless of traffic, an obligation from which the 'bus is almost or entirely free. There is the paving obligation from which the 'bus that runs over that paving is free. There is that host of taxes on costly buildings and land, on income, on the corporate form, sometimes even on trolley-poles or cars, from which the 'bus suffers next to nothing. There is the curse of the same fare regardless of the length of the ride, while the 'bus travels no farther than the fare will cover.

These are some of the burdens for which the railways themselves are not responsible to any degree, and they are burdens that would be paralleled in the long run by any regularly organized motor 'bus company. The Fifth Avenue Coach Company is not only the oldest and largest motor 'bus organization in the United States, but it is the one that has gathered unto itself the largest tax-bill in proportion to earnings. And the gallonage tax is yet to come. Since these are burdens imposed by the state, they will become equalized in time; so they present no really great danger for the older utility. In truth, the burdens that the electric railway has accumulated without the help of government are far greater. If these are not shaken off or greatly reduced in weight, the motor 'bus in independent well-monied hands will prove a real danger and supplanter in many of the smaller and medium-sized communities. First of all, the failure in the past to set aside amortization and depreciation funds to care for advances in the art has led to excessive replacement-needs at this time. Many companies are compelled to continue to operate with obsolete equipment because they can not borrow the money for efficient apparatus, thus suffering much higher costs than the state of the art makes possible.

In the second place, in seeking a rate of fare that will restore their credit, electric railways have valued their property on a "reproduction-cost-new" basis and then sought also a war-time rate of return on this valuation. The consequence, in a number of cases, has been that the resultant fare required is so high as to frighten off an appreciable proportion of the traffic. This brings us to the vital question—Have electric-railway fares reached a point where the motor 'bus can compete against and supplant the electric railway? I say without hesitation that any small-city electric railway charging a 10-cent fare to-day is absolutely vulnerable to such competition, should the state allow a capably organized company to come in. There are some two score communities of that character charging a flat fare of 10 cents, and between 40 and 50 cities or towns charging a 10-cent cash fare and 6 to 9 cents for a ticket.

The railways in 70 to 80 communities charging 8 and 9-cent fares are also in danger, provided the length of route is within 3.0 to 3.5 miles. The 7-cent and 6-cent street-railways hardly could be touched by a motor 'bus company so long as both had the same scheme of charging one fare regardless of the length of ride; but, if the motor 'bus operators were wise enough to do business only on a distance-fare basis from the start, they would be able to begin at a 5-cent minimum for, say, 1 mile. Therefore, it will be seen that unless the electric railways in such districts are willing to write down their valuations as remorselessly as a merchant writes down his out-of-date stock, they will not be saved by their inherently lower operating expenses. Here I may be taken up short by the over-enthusiastic 'bus advocate who does not like that last phrase about "inherently lower operating expenses." Nevertheless, it is true.

It has been my work to analyze a great variety of motor 'bus expenses, both real and theoretical. The real set-ups of actual expenses have been chiefly in Great Britain, where the motor 'bus is a valuable and important part of the mass transportation system and is almost always in railway hands. Although the basis costs differ materially from ours in at least the item of fuel, we know that they are based on actual and not theoretical conditions. When we look for the corresponding items in cost set-ups in this country we find, with few exceptions, that a considerable number of items have been overlooked. For example, many of the estimates show a cost of 1 cent per seat-mile, whereas inclusion of all legitimate items in company operation would bring the cost to 1.5 and even 2.0 cents per seat-mile. The accounts of electric railways operating motor 'buses confirm this estimate. Double-decked 'buses would be somewhat cheaper, of course, on the seat-mile basis. On the basis of the few well-kept accounts available in the United States it would seem that a 10-cent fare is the right fare for high-grade motor 'bus service covering rides in excess of 3 or 4 miles average length. Only 1-man operation in congested streets and within a route length of 2 miles offers the opportunity for anything like a 5-cent fare.

The statements of the average "jitney" operator are poor guides to the correct cost estimate of a genuine motor 'bus service. He works many more hours per day for himself than he would work for others, in running the car and in taking care of it. He has a direct incentive to collect all the fares and to waste no materials. He is just as liable as not to store his 'bus in the open. As for a standard of cleanliness, heating and maintenance, it does not exist and therefore costs nothing to get.

The statements of builders are necessarily more general. It is right for them to expect a certain number of miles per gallon of gasolene and lubricant and to anticipate a certain maintenance cost and depreciation per mile on the assumption that the operator will be careful and that he is equipped with proper facilities. It is not right for the prospective purchaser to accept these estimates unless he knows he can fulfil the builders' expectations in those two respects.

Daily mileage is an important element in determining costs. There is a wide difference between the cross-country vehicle that will make a practically non-stop run over a perfect highway with a good load between its terminals and the vehicle that will be used in any of the many varieties of city service. It makes a difference whether one runs 200 or 100 miles per day. The 'bus

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may be perfectly capable of doing 200 miles, but will there be any necessity for it in the given situation?

As previously indicated, a number of uses for the motor 'bus lie in the operation of extensions or cross-town services where traffic is thin and it is cheaper to have long lie-overs than to keep the vehicle shuttling back and forth. As a matter of fact, the operating cost of a modern safety 1-man car is little more than half as much as the operating cost of a motor 'bus of equal capacity. When we come to larger units, such as 2-car and 3-car surface trains, the disparity is just as great, aside from the fact that the same capacity in 'buses of single-deck type, in any case, would not be available in the same area. The superiority of the best motor 'bus to the best street-car does not lie in any saving in operating or running costs. It lies in the ability to meet situations, some of which already have been described, that no track-bound vehicle of any type could solve. We can not expect the 'bus to replace the car on a large scale except where the electric railway deliberately commits suicide. We can expect it to do what it already has done in Great Britain, to put a stop to all trackage development except extensions that will have heavy travel from the very first day that such routes are completely opened for the regular transportation of passengers.

The great sums that have been put into electric railways are not to be wiped out forthwith, although they are to be cut by the lopping off of weaker lines and small systems. But the future does belong almost entirely to the motor 'bus, because it makes possible the investment of capital in direct proportion to the business available instead of demanding almost as much investment for 50,000 as for 500,000 car-miles per annum. It is not necessary to assume the complete supersession of the electric city railway as a necessity for large motor 'bus development. The appetite of the people for transportation is far from satiated. What we should strive for is to secure constructive coördination rather than destructive competition, realizing that mass transportation is inherently a monopoly and should be under one direction whether the vehicles are propelled on a track or on tires, by electricity or by internal-combustion engines. Only in that way will each form of transportation find its true economic place.

Cotta Transmission Ready

The reorganized Cotta Transmission Company, manufacturer of parts for motor vehicles, has been incorporated with a capital stock of $750,000. The new company takes over the plant of the old and will operate along similar lines, but with new officers and directors. The new name will be Cotta Transmission Corporation.

Neill to GMC Factory

H. A. Neill, for the last five years manager of the Philadelphia branch of the General Motors Truck Company, has been transferred from this position to the factory sales staff. F. B. Tyler, one of the veterans of the motor truck business in Philadelphia and also of the GMC organization, succeeds him as branch manager.

Truck and Light Railway Work Together on Road Job

Truck Outfit Has Lower First Cost Than Industrial System for Same Work Capacity

TWO methods of hauling preproportioned dry batches were used by the Koss Construction Company of Des Moines in paving a section of the Lincoln Highway in Clinton County, Iowa. The section under contract is 17⅔ miles long, to be paved with concrete 18 feet wide, 7 inches thick at the edges and 8 inches at the center, with a 2-inch crown. The project starts at the west city limits of Clinton, running from there almost due west past Low Moor, Malone and DeWitt. The highway follows the route of the Chicago & Northwestern Railway very closely and material sidings are available at the small towns west of Clinton.

For construction purposes, the job was divided into four sections, the section at both ends of the project to be built with the truck haulage system, and the two middle sections to be built with the industrial haulage system. Local conditions were responsible for the choice of haulage methods. At both the eastern and western ends of the project the road passes through hilly country, and the grades were such as to bar the use of the industrial haulage system. Also in the west section, the central proportioning plant is located in the city of DeWitt and it is necessary to haul through the city. Both the center sections are in comparatively flat country with grades not exceeding 4 per cent.

The first set-ups were on the western end—the truck-haul proportioning plant at DeWitt and the industrial-haul plant at Malone. When these sections are completed it is planned to move the industrial-haul plant to Low Moor and the truck-haul plant to a point near the west limits of Clinton. The remainder of the contract will be completed from these set-ups.

The central proportioning plant at DeWitt consists of an overhead storage bin, having a capacity of about two cars of aggregate. A long cement warehouse equipped with a push-car track down the center is built adjacent to the aggregate bin and the materials are dumped into the truck from separately operated measuring boxes.

Eight 2-ton Autocar trucks are used for hauling the batches to the mixer. Each truck is equipped with 2 Lee dump bodies. A 5-bag batch is used except for short hauls, where a 6-bag batch is used. The dead haul is a half-mile and the average haul is 1½ miles.

The industrial haulage loading plant at Malone consists of a tunnel for loading aggregate and a cement warehouse with platform for loading cement. The tunnel is long enough to accommodate a 15-car train, each car equipped with 2-batch boxes. The train is "spotted" under a series of bin doors in the roof of the tunnel. As the track is built with the natural slope of the ground a brakeman at the upper end is able to take up the slack in the 3-link car-couplings, and all the boxes of the ordinary 10-car train are loaded without switching. The steel boxes are of a standard size and the gravel is loaded to paint marks on the inside. Lack of head-room renders the tunnel dark, and the loading is done with the aid of miners' carbide lamps. Cement is added on top of the other aggregate at the cement warehouse. The track parallels the warehouse platform and is depressed so the tops of the batch boxes are level with the platform floor. Cement is brought to the train on hand trucks. A 6-bag batch is used, and as the load does not come to within a foot of the top of the box, the cement is not disturbed by wind. Metal covers for the boxes are provided in case of rain.

The industrial haulage equipment includes 3½ miles of 24-pound track on Koppel steel ties. Koppel steel batch-boxes and trucks are used. Five Milwaukee gasolene locomotives are in service, 4 pulling the trains and 1 for use around the loading plant in switching and emergencies. Each train consists of 10 cars, each carrying 2 batch-boxes.

In spite of the fact that the truck outfit uses a 5-bag batch and the industrial-haul outfit a 6-bag batch, the yardage placed by both outfits has been very nearly the same. The average speed per day is about 500 linear feet for each. The initial investment in the industrial-haul equipment was 60 per cent. greater than that in the truck-haul equipment, but the truck-haul requires a greater expenditure for up-keep.

The labor distribution for both outfits is as follows:

	Truck.	Industrial.
Supervision (superintendent, foreman, time-keepers)	7	7
Grading and form setting	3 teams 7 men	6 men 6 teams
Mixing	3	3
Spreading	2	2
Finishing	3	3
Curing	12	12
Truck or locomotive drivers	8	5
Maintenance of hauling equipment	4	3
Loading sand and pebbles	6	7
Loading cement	5	6
Miscellaneous labor at loading plant	3	2
Total	60	56

Cleary Joines Sharon

Announcement is made by the Sharon Pressed Steel Company, Sharon, Pennsylvania, of the appointment of William J. Cleary as assistant general sales manager. Mr. Cleary's headquarters will be in 1214 Dime Bank Building, Detroit, and his duties will cover the automotive industry in general.

For twelve years Mr. Cleary was with the Studebaker Corporation as assistant general purchasing agent and for the past two years general purchasing agent of the Willys Corporation with headquarters in Elizabeth, New Jersey.

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Furniture Business Profits by Prompt Delivery

By E. G. PERRY

Shipping Superintendent, A. Lowenstein & Sons, Boston

A VERY profitable feature of our business is our out-of-town trade, which is built up largely by the speed, convenience, and safety of our motor delivery service. Our house has the reputation of carrying high-grade furniture, and a considerable part of our business is with out-of-town customers who come to Boston to do their shopping. In fact, we have customers from all over New England; though naturally most of this business comes from the smaller cities and towns near Boston. These people prefer to shop in Boston because we can offer them the latest designs and a larger selection.

How did we get this class of business? Our firm saw that more and more people were shopping in Boston, because of the convenience of motor-car travel, and concluded that they would appreciate having their goods delivered the same way. An announcement in our regular newspaper advertisements informed the public that we were prepared to make our own deliveries anywhere within a reasonable distance, and our trucks did the rest.

In order to hold this trade, it is necessary for us to deliver their goods promptly to their homes. For this purpose we are operating two Garford trucks—a 1½-ton purchased a little over a year ago, and a 1¼-ton which is 6 months old. With these two we give our out-of-town customers the same good delivery service they would get if they were living in Boston.

Most of our deliveries are made within a 50-miles radius. Frequently, however, we go farther than that. We have made deliveries to Somersworth, New Hampshire, 75 miles away, and to Dalton, Massachusetts, 150 miles away.

If our customers had to get their goods by freight, they would suffer so much trouble and inconvenience that they would rather do their shopping in their home towns. When shipping by freight, the customers would have the trouble of going to the freight depot for their goods, or hiring the carting done, and having the subsequent inconvenience of unpacking the goods when delivered. Adding together the additional cost of material and labor for packing, hauling at both ends, and the freight charges, it would cost them more to ship by freight than it costs us to deliver by truck.

Occasionally, also, customers would find goods damaged when shipped by freight. This would mean sending the goods back to Boston, making out claims by both the customer and ourselves, and involve a great deal of correspondence. And the average customer does not like to be bothered with such correspondence.

Now when a customer wants a bill of goods delivered out of town, we find out when we expect to have a load for that particular route; or, if the bill of goods will make a load, when we can make delivery. In other words, our trucks are carefully routed, and seldom make a special trip except with a full load. On the other hand, we promise delivery on a certain day, and always keep our promises.

The truck starts out in the morning. The goods arrive on the day promised, and are carried in to the customer's home in perfect condition by our own men. There is no hauling from the depot, no unpacking, no damaged goods, no claims to make out. All the customer has to do is to indicate where he wants the articles placed, and sign for their receipt.

If we had to depend on freight, the goods would be slower in getting out of the store by at least a day, because it would take that long to pack them. Then would come the uncertainty concerning the arrival of the freight-car at its destination. Traveling distances of from 50 to 100 miles, with a possible transfer from one railroad to another, it would take goods from 4 to 10 days to arrive. All this uncertainty and delay is avoided by using trucks.

During the six months ended October 1, 1920, our 1¼-ton truck worked 152 days and traveled 6,460 miles, an average of 42.5 miles per day. It has had no repairs to date and only a few minor adjustments, so that we figure $300.00 a year will take care of maintenance and repairs. This truck is costing $15.86 per day to operate, or 37.32 cents per mile, including $5.99 per day for driver. This is fairly high for a 1¼-ton truck, but we are using pneumatic tires on it because we believe they give us greater speed and reduce the possibility of damage to the furniture. Using solid tires would cut our cost $1.87 a day. Also the roads around here, while very good, are often hilly, so that we average only 6.5 miles to the gallon of gasolene.

On the day the truck went to Somersworth the cost of operation was as follows:

Operating expense—150 miles at 18.33 cents per mile	$28.24
Fixed expense per day	1.87
Driver cost per day	5.99
Total	$36.10

On another occasion a bill of goods was delivered to Ashton, Rhode Island, a distance of 40 miles. On this trip the cost of operation was:

Operating expense—80 miles at 18.33 cents per mile	$15.06
Fixed expense per day	1.87
Driver cost per day	5.99
Total	$22.92

The trucks have handled our delivery problem very well and seem admirably suited to our particular conditions. Up to the present, we have not required much service of the Boston service department; but on the few occasions we have used it, have been given prompt and good service.

Operation.

Days operated	152
Miles traveled	6,460
Miles per day	42.5
Miles per gallon of gasolene	6.5
Miles per gallon of oil	180

Average Cost.

Cost per day (including driver)	$ 15.86
Cost per mile	.3732
Total cost for period	$2,410.90

Itemized Cost.

Driver cost per day (included above)	$ 5.99
Depreciation per mile	.0471
Maintenance and repairs, estimated, per mile	.0232
Tire cost, estimated, per mile	.0670

Trucks to Relieve Ports

Serious consideration is being given the motor truck as the means for affording temporary relief of port congestion in New York, and for handling general package freight between New Jersey and Manhattan. That the need for some such action is vital has been recognized by the authorities for some time and is now being given careful consideration by the recently constituted Bi-State Port Development Commission.

Particular attention has been directed by the commission to the possibilities of installing a special motor truck service for the handling of general package freight between lower Manhattan and the railroad-yards in New Jersey and the elimination thereby of railroad cars of every sort for that service. The system, according to the report submitted by the commission, would include the New York Central, making it possible to eliminate the running tracks from Thirtieth Street south, although the yard at Thirtieth Street, like the other inland yards in that vicinity, would remain in service with float-bridge connection, as in the plan recommended by the commission. The trucks would be large and in general of uniform design and capacity, with detachable bodies, operating on a schedule to and from terminals established in Manhattan, at which there would be machinery for moving the truck bodies on and off the chassis with a minimum of delay.

Motor truck transfer platforms could be placed in the water-front yards in Jersey City, Hoboken and Weehawken, to each of which two or more ferry lines reach, and that the existing ferries would have sufficient surplus capacity to take the motor trucks of the system. A similar freight-car motor truck transfer station would be built at the Sixtieth Street (Manhattan) yard of the New York Central. The truck bodies would have a capacity of 5 tons each.

Motor Trucks in Algeria

To supplement rail service Algerian farmers commonly use motor trucks to transport their products. The total of good vehicle roads in the colony is about 100,000 miles. Following the large wheat crop of 1918, the motor form of carrier had increased from 53 trucks to 287 at the end of 1919, and the increase now continues in the same proportion. Rail and motor vehicles combined are, however, still inadequate for the development of trade in the country.

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Will Heavy Trucks Be Barred?

Federal Road Report Warrants the Inference that Official Opinion Inclines to Prohibition of Heavy Traffic as a Solution of the Highway Maintenance Problem

THE proper regulation of unusually large motor trucks because of their wear and tear on the nation's highways, or of restricting their use to certain roads designed to accommodate them, is suggested for consideration in the annual report of the Bureau of Public Roads, United States Department of Agriculture. The bureau, under whose supervision federal-aid funds totaling $200,000,000 have been expended on highways costing $467,000,000 during the past five fiscal years, asserts that the problem of the heavy motor truck is one of prime importance, pressing each year with more weight for solution.

The reduced unit cost of operation which follows from the transportation of commodities in greater bulk tends to promote the development and use of vehicles of the largest capacity which can be used to advantage, the bureau says. It is desirable to gain this advantage, if it is actually an advantage, but it is this point which is seriously in doubt, according to the report. The doubt arises from the fact that the roads which are adequate for traffic of automobiles and light trucks are entirely unable to support the weight of the heavier trucks, and to build roads which will carry the heavy vehicles will greatly increase the costs of construction.

Whether the operation of the heavier vehicles shall be restricted to a class of roads especially designed to accommodate them, or whether all roads shall be strengthened to provide for unrestricted use, or whether the third alternative shall be adopted and the operation of the heavier trucks prohibited will depend upon the relation which is found to exist between reduced operating cost and increased cost of construction.

The situation presents an economic problem of the first importance which is not to be solved hastily, but which must nevertheless be met and disposed of. To do so demands a careful weighing of the effects of the several possible solutions with a view to the selection of that one which, in the long run, will serve best to accomplish the one desirable end—the improvement of our means of transportation.

The prime importance of an accurate knowledge of the weights of the vehicles which are to use the roads constructed is well illustrated by the experience of one of the states in which the Bureau of Public Roads made an extensive investigation during the past year. Ten years ago this state set out upon the construction of a system of roads. The roads were designed and built to meet all the reasonable demands of the traffic which were then foreseen. In the brief time which has elapsed roads have been constructed which penetrate to all parts of the state, some of which, however, have been seriously damaged by heavy motor vehicles, the use of which was not foreseen when the roads were constructed. The bureau's investigation reveals that in this case the return from the roads in the reduction in the cost of transportation and in the development of the territory they traverse has undoubtedly compensated for the loss resulting from their destruction; but it is not by any means certain that the outcome will be so fortunate under other conditions according to the report.

For the security of the enormous investment which is being made by the states and federal governments it is imperative that this question of the duty which the roads will be called upon to render in the future shall be definitely determined. A clearer conception of the relative economy of heavy and light vehicles can be gained by careful study.

The bureau at the present time is engaged in conducting investigations designed to determine accurately the load-carrying capabilities of various kinds of roads, of various thicknesses upon different kinds of subsoils—a study which will yield valuable information in meeting the problem outlined above. These experiments are being conducted in various sections of the country, in co-operation with state highway departments, and at the bureau's experiment stations. Another problem presenting itself for solution and under investigation is the variance of the classes of traffic to be served in different localities. Pointing out that the demand for good roads comes from all classes of highway users, the bureau asserts:

"The demand of the farmer is for roads from the shipping points and agricultural centers to the surrounding producing areas —farm-to-market roads. The manufacturer and city merchant ask principally for roads which will facilitate the transportation of raw materials and manufactured commodities which flow to and from the cities. The tourist and that large section of our urban population whose direct interest in the rural roads is due to the opportunities for pleasurable recreation which they afford, are particularly concerned in the development of a system of smooth, hard-surfaced roads connecting the cities and points of natural interest. Thus, from the several classes the demand is for roads to meet their particular requirements, while all unite in an appreciation of the need for development of a system of roads which shall serve as a complete supplement to the railroads in the event of war. All these are proper demands, which must be accommodated as rapidly as the resources and means of construction will permit. Fortunately the more important requirements of each group may be met by the improvement of a relatively small part of our mileage of public roads."

Approved projects for federal aid in road-building, up to the end of the past fiscal year cover 35,402 miles for the 5-year period ending June 30 last, and involve the expenditure of $587,000,000, of which nearly $248,000,000 represents the federal government's contribution. The total mileage of completed federal-aid projects during the past fiscal year was 3,809, and the average cost per mile $13,035.

Michigan 'Buses Make Money

High steam and electric railroad passenger rates are proving a boon to operators of interurban 'bus lines. The investment required is so small and profits so large, that scarcely a day passes without announcement of new 'bus line enterprises in Michigan.

One company, having an investment of $30,000, operating 4 motor 'buses, is earning 70 per cent. for its stockholders after allowing for repairs, and replacements based on a 4-year use of equipment. A 'bus seating 20 passengers costs $4,000 to $5,000 and experience of this company shows costs, including all charges, are slightly less than 18 cents a mile. Three round trips of 50 miles each are made daily by each 'bus and, with an average of 60 per cent. capacity load, and 2½ cents a mile rate per passenger, the daily net profit per 'bus has been $18.

The response of travelers has been so generous that 'bus companies have advanced their rates to 3½ cents a mile in steam railroad territory and 2½ cents a mile in electric line districts. The increases have extinguished any differential under rail rates without affecting the volume of 'bus business.

Standardized Danger Signs

Standardize danger signs along American roadways; make them alike from coast to coast. So urges the Bureau of Public Roads, United States Department of Agriculture. The recommendation is made for the consideration of highway officials, motor organizations, municipal officials, and other persons interested.

By standardization of all highway danger signs the department believes motor accidents may be lessened. Deaths from such causes have nearly doubled since 1915, and the rapid increase of such accidents, the department believes, can be appreciably checked by the adoption of standard danger signs, easily read and distinctive, along American highways. A driver at the present time will see almost as many kinds of signs as there are states he visits. Also, in some cases, the style of sign changes in going from one county to another. The subject is now under consideration by a committee of the American Association of State Highway Officials.

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Saves 2.41c a 100 Pounds Over Horse Costs

By J. W. LEVERING

General Manager, Eavenson & Leve ing Company, Camden, New Jersey

WE ARE engaged in the wool scouring and carbonizing business, and are the largest concern of its kind in the United States. In December, 1919, we purchased a 3½-ton motor truck for making our long-distance hauls. This truck calls at the various mills in the vicinity of Philadelphia, and picks up loads of raw wool which it hauls into our plant for scouring and carbonizing. When the wool has been treated, it is returned by the truck to our customers. These consist of woolen mills in Philadelphia, Germantown, Kensington, Manayunk, Norristown, and other nearby cities. Some of the hauling is also done from the various dealers' warehouses.

During the nine months ending November 1, 1920, this 3½-ton truck—a Selden—operated 215 days and made 362 round trips, hauling 1,245.36 tons. It averages two stops to the trip and hauls slightly less than 3½ tons to the load. The daily mileage varies considerably, running to 90 miles a day, averaging slightly over 22 miles.

In this calculation we have allowed 5.33 cents a mile to cover repairs and maintenance. This should prove ample, for in the nine months period the total cost for repairs and maintenance was only $62.81, of which $19.77 was for repair labor, $36.44 for repair materials, and $6.60 for grease.

The truck ordinarily carries a driver only, but we sometimes employ an extra man whose wages are charged against the truck. The wages of driver and helper average $5.33 a day. The truck cost $14.79 a day, 66.17 cents per mile, 12.77 cents a 100 pounds, and 1.92 cents per 100-pound-mile.

To show how the cost of hauling by truck compares with the cost by team, we made a comparison in March, 1920. Our cost by truck was 11.43 cents a 100 pounds per cwt., while the cost by team for November, 1919, was 13.84 cents. The truck therefore effected a reduction of 2.41 cents a 100 pounds in our hauling cost. On the assumption that this is the average saving which the truck effects, the annual saving based on the amount of hauling done during the 9-months period would amount to slightly over $800. Of course, this figure is only approximate, but it gives some idea of the saving which the truck is effecting.

In making this comparison we don't wish to be understood as saying that horses are always more expensive than trucks, because this is not the case. In fact, we are still handling our shorter hauls with horses. But the longer hauls are handled with the truck.

This truck's job is to haul raw wool to the plant and treated wool to the customers. Such has been the service given that the customers ask for delivery by truck. Operating on an average 22 miles a day, the cost is $14.79 or $2.55 per ton. On the long-distance trips, for instance to Norristown, the truck costs are:

Variable charges (40 miles at 34.13 cents)	$13.65
Fixed charges (½ day at $1.64)	.82
Driver's wages (½ day at $5.53)	2.76
Total	$17.23

With load only one way, this is $4.92 per ton.

Smoking Cigar on Wheels

A 9-foot cigar, facsimile of the original in every way, is attracting much attention in Boston as it goes up and down the main thoroughfares, smoking incessantly. It is mounted atop a standard Dodge motor vehicle. In the interior of the machine is concealed an arrangement for producing the smoke or vapor, which filters out slowly through perforations in the ashes. The effect is very realistic. The advertising value of the device is increased by the mystery of the steady flow of smoke, as there are apparently no pipes, hose or other connections between the cigar and the body of the car, except the flat iron braces, which are painted to be hardly recognizable.

The first of these cars was sold to Alles & Fisher, cigar manufacturers, by the Henshaw Motor Company, Dodge dealer in Boston. Henshaw holds patents on the contrivance, and already has created a demand which will undoubtedly result in many other sales. Salesmen who drive the car say it never fails to make an impression on the retailer, and therefore assists materially in making sales. This is chiefly due to the fact that the retailer likes to buy from a manufacturer who advertises extensively and this novelty is a good indication of unusual activity in that line. The principle of the cigar is also being applied to other lines of business whose product is a smoke, steam or vapor producing article.

Truck Brings $3,500 Worth of New Trade Weekly

By G. A. HESS

Oswald & Hess Company, Pittsburgh

BY INCREASING our delivery range, motor trucks have increased our business 50 per cent in two years. We are operating a slaughterhouse and packing-plant, where we slaughter 450 hogs a week, besides curing bacon, boiling sweet pickled ham, and packing various other kinds of meat. All our product is sold to retailers in Pittsburgh and vicinity.

For six months we have been using a 2½-ton Selden truck for the heavy hauling work. Three days a week this trick runs about the city. In the morning it makes one or two delivery trips to meat markets in Pittsburgh, sometimes making as high as 30 stops. The remainder of the day it hauls meat from the freight depot to our packing-plant.

On the other three days of the week, besides doing some freight hauling, the truck makes a long trip to towns near Pittsburgh, such as New Kensington, Natrona, and Beaver Falls. On such trips it covers all the suburbs within a radius of 30 miles, and makes between 35 and 40 stops. This is a pretty heavy day's work, but the truck carries a helper to speed up the loading and unloading.

This suburban business amounts to $3,500 a week, and represents about one-third of our total business. It is a very profitable branch of our business, and could not be handled properly in any other way. Freight shipments would be too slow and uncertain, besides being very costly, because of the hauling necessary at each end of the line.

The truck is also delivering loads of considerable value to local markets, and doing a good deal of freight-station hauling. It provides just the type of delivery service that we need, fast and dependable.

In Pittsburgh all the small markets open at 8 o'clock, and they all want their meat delivered by 9. With the truck we are able to make one early morning trip to the big markets, which open before 8 o'clock, and still have time to deliver loads to the smaller markets by 9. By giving customers the service they want, we have no trouble in selling our output.

This truck was bought specially to take care of our suburban business and if it did nothing else it would be a good investment; but it is also doing other important heavy duty work.

The operating cost is very satisfactory considering the conditions under which the truck runs. The fact that it gets 3.3 miles to a gallon of gasoline is really a favorable showing in view of the many stops it makes, and the heavy traffic, bad roads, and steep hills it encounters.

Our books show the following total costs for six months:

Total variable charges	$1,273.00
Total driver's wages	1,170.00
Total fixed charges	398.52
Total cost (153 days)	2,841.52
Cost per day	18.57

We feel this is a small price to pay for the $3,500 worth of increased business it handles for us each week.

Registration figures from Nebraska indicate that there were in that state on October 1 the following number of machines: Trucks 18,530, trailers 309, passenger-cars 217,247.

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New Highland Cabs

Something new in cabs for trucks has just been put on the market by the Highland Body Manufacturing Company of Cincinnati. It is in effect a combination open and closed cab—a closed cab which in a minute can be opened as completely as an open cab.

There are two sizes of this cab and they will fit any truck on the market. They have been designed so that they can be fitted to chassis of any make. One size, 54 inches wide, is a light cab for speed wagons or 1-ton trucks. The other size, 50 inches wide, is for all trucks of greater capacity.

Both cabs are adjustable in length to fit any chassis, and the tank compartment is adjustable to fit any tank. This new Highland sliding-door cab is a universal cab, equipping the truck for use, summer or winter. When closed it is perfectly tight and provides clear vision. When open it is as open as a regular open cab. The vision is not obstructed by door pillars or hinge pillars. The driver can get out or in at either side with ease.

All moving parts are constantly under heavy spring control which prevents rattling and noise and takes up wear as soon as it occurs. The doors slide into pockets and automatically lock, either open or closed. The windows slide and fold into the back of the cab and are positively locked in all positions. The rear window drops into a wall behind the lazy back. The windshield is of the standard Highland type, full vision, and full ventilating. All wood parts are of the oak or ash. The wood pillars on which the strength of the cab depends are straight without cross grain. The steel parts are heavy-gage rust-resisting auto-body stock.

Two-Engined Rail Motors

An interesting departure in rail-motor design has been made in England where, in developing equipment for a railroad in Uganda, the Guy Motors, Ltd., has produced a type of machine using two engines, each of 30 horse-power. The front of the tractor rests on a 4-wheeled bogie with flanged wheels for running on the rails, but the rear wheels are rubber-tired and run outside the rails on a macadamized surface. The bogie truck can be removed and replaced with the regulation type of Ackerman steering equipment and rubber-tired road wheels. The engines are placed side by side over the driving axle, and drive through a pair of cone clutches and a short flexible shaft and a silent chain reducing gear, with a dog-clutch interposed, which serve to couple both power sets as a common unit. Thence the drive is through a shaft and a 4-speed-and-reverse transmission to a spur-and-bevel-gear axle. The tractive capacity of the tractor is 250 tons on the level on low gear, and 50 tons at 13 miles an hour on high gear. The cost of the new system per mile of way is under $10,000 (including tractor, trailer and the cost of the roadway), as compared with $40,000, which is the cost of similar service on a light railway.

Milk Collection Costs 11.58 Cents Per Can by Motor Truck

By A. G. ALLEN
Manager, Prairie View Dairy, East Chicago, Indiana

MILK collection is a seven-day-week job, so our truck's perfect record for the last 18 months is some credit of a 4-year-old motor truck. Every day in the year this 3½-ton truck leaves the dairy at 5 A. M., and runs 22 miles out to a point between Brunswick and Cedar Lake. From there it starts back, making 16 stops on the way, and picking up anywhere from 110 to 125 cans of milk, according to the season of the year. The truck is back with its load at 10 A. M.

The service a dairy requires of a motor truck is more severe than that in almost any other business, because milk must be handled Sundays as well as week days, regardless of weather conditions. In the last year and a half our truck—a Garford—has not missed a day. During the blizzard that hit this part of the country at Easter, we made our regular trips, merely asking the farmers to bring their milk to the traveled road.

The farthest point from which the truck collects milk is 22 miles from East Chicago; the nearest point is 18 miles. Regardless of his exact distance from the dairy each farmer pays us 25 cents per can for all milk hauled. Empty cans are returned free. The distance is so great that horse hauling is out of the question, and it would not pay each farmer to keep a truck for the purpose.

Assuming that an average load is 115 cans of milk, we are getting $28.75 per day for hauling. Our operating cost per day is $13.32, as explained later, so that the truck is earning a fraction over twice what it costs to operate. Furthermore, the truck is bringing the milk from the district to our dairy, instead of letting it go elsewhere, as it would if we did not provide this cheap, dependable transportation to our dairy.

We had the sides of our truck body built up solid so that we have a box body twice as high as ordinarily This enables us to double-deck the cans without their sticking out at the top. In fact, the sides stand a little higher than the cans, so we can throw a canvas over the load in summer time. This helps keep the milk cool and prevents it from spoiling.

For the last 18 months we have not spent a dollar on the truck for repairs. Some minor repairs were made two years ago, but the repair cost for the whole four years has been very small. We figure repairs on a basis of $400.00 a year; but with my son looking after the truck, as he does, it will probably come under this estimate, in spite of the hard work it is doing.

During this 18-month period the truck worked 547 consecutive days and traveled a total of 25,162 miles, an average of 46 miles a day. The actual distance from the dairy is only 22 miles, but the truck runs about 2 miles a day farther picking up cans on cross roads. Our operating costs are $13.32 per day, or 28.95 cents per mile. This includes $2,000.00 per year for driver, and $25.00 per year for garage. Actually the garage costs us nothing, because we simply run the truck into the shed where we load our milk wagons.

We estimate the truck's life at 100,000 miles. As it is nearly four years old now, and has done 17,000 miles a year, this estimate seems fair enough. We shall be surprised, however, if the truck does not give us somewhat longer service than this estimate calls for.

We can carry our analysis of costs a little further by averaging the truck's performance the last 18 months. In that time we know the truck operated 547 days and traveled 25,162 miles. The average operating cost was $13.32 per day, 28.95 cents per mile. If we assume that each load of milk averaged 115 cans, the total number of cans hauled in 18 months would be 62,905. So the average cost per can would be 11.58 cents, or .58 cent per can-mile, based on an average haul of 20 miles. If we assume that each load averaged 920 gallons, the total number of gallons hauled would be 503,240. So the cost per gallon would be 1.45 cents or .072 cent per gallon-mile.

By giving regular, low-priced service every day in the year, the truck is providing the milk producers with a steady market, supplying our dairy, and in addition making a profit on its operation of over $5,600.00.

Some of our detailed costs are set out below:

Operation.	
Days operated	547
Miles traveled	25,162
Miles per day	46
Miles per gallon of gasolene	4.5
Miles per gallon of oil	296
Itemized Cost.	
Driver cost per day	$ 5.48
Depreciation per mile	.0317
Maintenance and repair, estimated, per mile	.0238
Tire cost, estimated, per mile	.0440
Average Cost.	
Cost per day (including driver)	13.32
Cost per mile	.2895
Total cost for period	7,285.06

Evans Handles Winther Advertising

The appointment of H. G. Evans as advertising manager of Winther Motors, Inc., Kenosha, Wisconsin, has been announced by Homer Hilton, vice-president and general sales manager. After four years' service with the company in various sales and service capacities, and a previous wide and diversified advertising and sales experience, Mr. Evans is well qualified to assume the important duties of his new position. Prior to his association with Winther Motors, Inc., he was connected with the Street Railways Advertising Company, with headquarters at Chicago.

France had a registry of 237,125 automobiles and 50,783 motor-cycles in 1920. Out of the 237,125 automobiles registered, 79,076 were motor trucks.

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Fear of Pneumatic Tire Bursts Unfounded

Tests Made at High Speeds with a Specia Appliance Show Complete Absence of Danger

THE fear of bursting tires and the consequent risk of accident has deterred many from applying pneumatic tires to heavy-duty machines and it has not been without some reason that truck owners have hesitated to experiment with this type of equipment for the handling of large loads. Interesting experiments have been concluded in England and the results are uniform in showing that the danger is more imaginary than real. In spite of the assurance given by the pneumatic tire makers to the effect that giant pneumatic tires do not burst and that, even if they did, no harm would result, dire effects have always been predicted, fear being expressed that in the event of a blow-out stones would be thrown in every direction, windows broken, pedestrians injured, the vehicle overturned or at least ditched, and the driver harmed.

The Goodyear Tire & Rubber Company furnished a 4-ton truck equipped with giant pneumatic tires for the test, which was conducted by neutral observers. A special device was made to produce the desired burst, for it was evident that previous cutting of the tire, the use of a high explosive, or the puncturing of the casing by a revolver bullet would not produce the proper effect. Therefore, two spikes, 1 inch across and 6 inches long, with sharpened chisel ends, were set obliquely in a thick iron plate, and the whole was fastened down to a board of ash 6 feet long and 1½ inch thick. The spikes were set on a cant, the idea being that they would pierce straight into the tire, but that, as it left them, they would be torn out sideways. It was thus hoped to produce a jagged tear some inches in length so as to give a true burst.

The test and the results are thus described by *Motor Transport*:

To make the test fair, it had been decided to get as near as possible to motor coach conditions. The truck was, therefore, loaded with 2 tons of ballast to represent 28 persons. It also carried the driver and an observer. The body fitted is of the high van type, the unladen weight being 8,448 pounds. Goodyear 40 by 8 inch tires were fitted, some old and well-worn ones being put on the off side wheels for the purpose of the tests.

A preliminary run was taken to see what distance was needed to attain 25 miles per hour from rest, and to give the driver practice in running the off side front wheel clean over the "gadget."

The truck came along, doing great work on deep pot-holes at 27 miles per hour, in spite of the pneumatics, and the bursting implement proved entirely successful. The tire burst instantly with one clean report. There was not the slightest doubt as to it being a clean burst, for the tire was completely flat within 8 feet of the spikes; all the air that mattered was out in less than a quarter of a second.

The report was sharp, but not extraordinarily loud. The nearest member of the party, about 15 feet off, reported no evil effects, in fact no effects whatever; and there was no important swerve of the vehicle. The road at the point chosen was 9 feet wide; the track of the truck 6 feet; so that there was only 1 foot 6 inches clear on each side, and the machine remained under control so easily that the driver was able to steer round the next pot-holes, 20 yards beyond the bursting point.

The speed was 27 miles per hour, and the driver was taking no especial precautions. He stated that there was a certain drag at the wheel from the flat tire, but no danger or even difficulty whatever. The tire was inflated to about 110 pounds per square inch. The "drop" of the vehicle on the burst tire side amounted to only 4¾ inches. There was a jagged tear in the cover 4 inches long, and a 5 inch slit in the tube.

After fitting a new front tire, the second test was started. The great difficulty here was for the driver to miss the spikes with the front wheel and swerve across to hit them with the rear. It was found after several trials that this could not be done at 25 miles per hour, so the speed was lowered to 15 miles per hour. Unfortunately, the observers did not in this case get a clean burst. The spikes only got the edge of the tire, puncturing it with two 1 inch slits, so that the air took about 20 feet, or, roughly, one second, to escape. No bad results whatever were produced, not even the slight drag noticed when the front tire was flat. Incidentally, this second test demonstrated very well the strength of these tires, for the spikes entered more or less sideways, and the tire twisted the 1½ inch ash plank clean in pieces rather than let itself be ripped. In the case of the front tire, which ran directly on to the spikes, this could not happen, as the truck's weight, of course, held the board down solid.

New Stewart Speed Truck

The Stewart Motor Corporation, Buffalo, announces a new ¾-ton speed truck. It has a genuine rear truck axle, truck-type radiator, truck-type wheels with cord tires all around. It shows an average of 14 to 16 miles per gallon of fuel and a speed of 45 miles per hour with capacity load.

In designing the covered and open express bodies the seat has been made separate from the top, thus enabling the owner to convert a covered express into an open express body with the addition of a cab, which will interchange on the seat of either the open or covered express.

The Stewart ¾-ton speed truck uses the new Buda model MU motor, which has a bore of 3⅝ inches and a stroke of 5⅛ inches. It is rated at 21.03 horse-power, S. A. E.

The Remy system of ignition is used. Carburation is accomplished by the new model Zenith carbureter, which is adjustable with a hot-spot quick-starting device.

The gasolene is fed to the carbureter by gravity from a 16-gallon round tank made of terne-coated steel to prevent rusting and corroding, supported on malleable iron brackets under the seat.

The engine lubrication is through a full forced feed to the crank-shaft, cam-shaft and connecting-rod bearings. The chassis lubrication is through the Alemite system.

The radiator is of the cast-iron armored type with vertical tubes, and has a capacity of 5 gallons.

The clutch is of the dry-plate, single-disk type, with one set of steel plates, and another set of steel disks lined with moulded clutch facings.

The engine, clutch and transmission are mounted as one unit, on 3-point suspension. The shafts of the transmission are mounted on annular ball-bearings.

The rear axle is a Clark internal-gear drive geared 5.53 to 1 so the total reductions from engine to rear wheels are 5.53 to 1 on high, 10.27 to 1 on intermediate, 17.08 to 1 on low, and 21.10 to 1 on reverse.

The front axle is of the drop-forged type, 1¾ inches wide by 2⅜ inches deep.

The steering gear is of the screw-and-nut type with an adjustment on the thrust bearings for removing any end motion of the screw that may develop.

The frame side rails are 4½ inches deep and 2¼ inches wide, and the thickness of the steel used is 3/16 inch. There are three cross members, two of which are not-riveted in place.

The springs are the semi-elliptic type, 41 inches by 2 inches wide in front and 54 by 2 inches in the rear, equipped with a full length rebound plate. The entire spring is made of silico-manganese alloy steel, heat-treated for flexibility and equipped with bronze bushings working on hardened steel pins, equipped with the Alemite high-pressure lubricating system.

The truck is equipped with 32 by 4½-inch cord tires all around. The regular equipment consists of electric head-lights with legal lenses equipped with dimming device, electric tail-lamp, tool-box, 111-hour Willard battery, tools, jack, horn, oil-gage, and armature. The chassis is painted Napier green with black fenders and running board.

The price of this chassis complete with the above equipment, is $1,395.00, plus war tax, f. o. b. Buffalo.

Public Motor Vehicles in Britain

A recent census of the number of motor 'bus, motor coach and other motor passenger services in the United Kingdom shows that there are 1,888 such undertakings in the kingdom, of which 100 are operated by municipalities, 1,280 by companies and 508 by private firms. These figures compare respectively with 800, 97, 584 and 119 in 1920; 486, 75, 317 and 94 in 1919; 395, 72, 263 and 690 in 1918; 374, 66, 250 and 58 in 1917; and 331, 69, 218 and 44 in 1916. In 1921 these undertakings employed, as shown by reports from 466 of them, a total of 11,586 motor vehicles, the companies accounting for 10,937 and the municipalities for 649.

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What to Do with Used Trucks

Manufacturers Attack Problem from Different Viewpoints and for That Reason Offer Various Suggestions for Its Solution

Overproduction the Curse

To the Editor:—I cannot see how the practice of accepting old trucks as part payment for new ones can be stopped at this time. The matter has been under discussion at numerous meetings of the National Automobile Chamber of Commerce. For a period of two years I have attended these meetings consistently and, out of all of these discussions, taken part in by the majority of the leading manufacturers, has come no definite solution whatsoever of the situation. Obviously, with the industry overcrowded with manufacturers and dealers who, in the majority of cases, have no legitimate right to be contenders in the field, we must continue to be cursed with the evils of over production on the one hand and illegitimate merchandising methods on the other.

The only other plan for the regulation of this evil that could be suggested would be the appointment in each trade center of a disinterested appraisal board to whom the owner of the second-hand truck would be compelled to go to get an appraised value on his truck. This would appear to be a satisfactory solution, but it does not work out in practice because of the over crowded condition mentioned.

Individual efforts on our part to eradicate the trade-in evil would have little or no bearing on the industry at large. We, of course, are trying to help our dealers confine trade-in activities to our product alone. In some few cases they are doing this successfully. Under such circumstances it is often possible for our dealer to retire the vehicles so taken in, disassembling them and salvaging the non-moving components in service work.

It is our firm opinion that procedure along these lines would do little or no good toward the final solution of the situation. This condition must go on until there is an elimination of the dead wood in the industry, both from the manufacturing and merchandising angles. We hail the present period of depression as a blessing in disguise alone these lines. Already the mortality among the above mentioned manufacturers and dealers has assumed gratifying proportions and it is apparent that the immutable law of supply and demand has at last asserted itself in the proper regulation of an industry that has been badly in need of such a prescription for some time.

GENERAL MANAGER.

Detroit, Mich.

"Trading-In" Must Be Stopped.

To the Editor:—The practice of trading for old trucks, as it has been carried on by the majority of truck manufacturers and dealers during the last year or two, should be stopped. It probably will not be stopped, however, by the worst offenders until they find that their capital is tied up in second-hand trucks of little or no value; or until the public learns to appreciate what it already knows—that it can not get something for nothing; or until the user learns the difference between trucks honestly priced and those that carry a fictitious list price for the purpose of providing a "trading" margin.

To illustrate with a specific instance: One of our dealers had a new truck "prospect" who had an old one that he wanted to trade in. Our representative inspected his truck and, according to his judgment, it was worth only so much per pound as junk. He offered to allow the junk value, which he estimated at $180.00. The "prospect" received an allowance of $750.00 for his old truck from a competitive dealer. Either the competitive dealer lost money in order to make a sale, or the list price of his new truck carried a sufficient trading margin to enable him to make such an attractive offer.

Another case: A big user who wanted 8 new trucks had 14 old ones to trade in on the new ones. Our dealer inspected the old trucks, offered every dollar he felt he could resell them for, which was $750.00 each for 8 of them against 8 new ones, the latter priced at list. His competitor got the order by selling the 8 new trucks at a discount of 20 per cent from list, and taking in the 14 old trucks at $1,650.00 each.

To my mind there is no more reason why a truck dealer or manufacturer should be expected to take second-hand trucks in exchange for new ones than that you or I should expect our clothing merchant to take in our old overcoat at half or two-thirds its original cost in exchange for a new one. It is a pernicious practice inherited from the old sewing-machine policy, which seems now to be operating only in the automotive industry. I believe even the worst offenders will admit that it is unbusinesslike, fundamentally unsound and will ultimately have to be discontinued to save the industry from ruin.

There is a certain demand for used trucks that are still capable of giving service, just as there is a certain demand for second-hand furniture. In almost every town there are one or more dealers who make a business of buying second-hand furniture, who fix it up and resell it, but when the house-wife decides that she wants a new davenport and chairs to match, she doesn't even think of the dealer in new furniture in connection with the disposition of her old parlor set. She looks up the second-hand man or the auction house.

The motor truck business is a legitimate business. The motor truck is as necessary to present-day business as the telephone, the typewriter and the hundreds of other labor-saving appliances that make for better and bigger and more economical business methods, and the motor truck business should be conducted on the same fundamental principles that have proved successful in other legitimate lines of business, to the end that this necessity to industry may be economically built and honestly priced. If honestly priced, it must be sold for honest dollars or their equivalent and not exchanged for used trucks that can't be sold for the price at which they were taken in.

GENERAL MOTORS TRUCK CO.
W. L. DAY, *Pres.*

Pontiac, Mich.

Suggests "No Value" Plan

To the Editor:—The one regrettable feature in the merchandising of motor trucks is that the business is so closely linked to the passenger car end of the business industry. The selling of motor trucks should be classed with the selling of machinery, in the one case we sell machinery for the transporting of merchandise, while the machinery house sells its product for the transporting of power to do a certain work. If the merchandising of motor trucks could be divorced from the passenger-car industry and our business placed in the proper classification, there would be no so-called used-truck problem to solve. By that I do not mean to imply that trading would cease—that can never be—but instead of a problem it would be something tangible and easily managed.

Granting that the manufacturers, through the National Association of Motor Truck Sales Managers or a combined organization of the Motor Truck Manufacturers' Association, could and would agree on a "no value" point for their various models, and the information were passed along to the dealer through the proper channels, many trucks that are now traded in would go to the scrap-heap instead of the dealers' inventory at a greatly inflated value. A truck is only good for a mile's value and a tonnage value and once having performed those functions it has outlived its usefulness. The "no value" period of the truck having been definitely determined, should such a truck be presented for trade the dealer would, if he were wise, refuse to consider it at any price on the trade for a new truck.

The dealer will always have the "trade in" evil with him, but instead of an evil it can be made a source of profit, if he will but "stand pat" on a definite and fixed policy based on values. No dealer should tie up his working capital in the purchase of goods he can not sell at a profit, but all this talking and writing will not go far to change the scheme of things until the day arrives when he fails or is being sold out, and on that day he will realize his fatal mistake. The factory that forces the dealer to buy or load up is just as guilty of re-

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sponsibility for the second-hand evil as the dealer.

A plan that will, in a measure, help to solve the problem will be based on these thoughts:

(1) The dealer must confine "trade-ins" to the truck he sells.

(2) If he must go outside, he should base his allowance on a resale "as is" and allow no more for it.

(3) He should have a fixed amount to invest in trades and never under any circumstances exceed that amount. When the limit has been reached, he should stop trading until the value of his second-hand stock will permit of further trades.

If the factory insists on the dealer purchasing a specified number of trucks each year, whether the dealer has a ready market or not, it should provide a contingent fund with which to help him unload his second-hand trucks. I would rather have any one of our dealers sell 25 trucks and sell them clear with a real margin of profit than have orders for 125 trucks and at the end of the year find the dealer on the rocks and stocked with a lot of high-priced, unsalable second-hand junk. If the factory does not control the sale or has no voice in the "trade-in," there is no reason why it should shoulder any of the financial responsibility.

Boiling it all down, I would say:

(1) The practice of accepting old trucks as part payment for new ones can not be stopped entirely, but it can be regulated.

(2) There is no plan, to my way of thinking, that will protect the manufacturer or distributer. What applies to one will overshoot the mark of the other.

(3) We should work out a plan of "trade-ins" as outlined in the above general remarks, whereby values will be scrutinized and old junk be refused.

R. T. P.

Rochester, N. Y.

Industry Faces Bankruptcy

To the Editor:—As it appears to me, unless we can do something with the second-hand truck problem, it is going to hinder very much the progress of the truck business, and the one great point that must be driven home in the minds of the user, as well as the dealer and the manufacturer, is that the user must have his machine overhauled, and wear it out. Under the present method he is able to get very much more for his old automotive unit than it is worth, and somebody somewhere down the line has to take the loss, and this loss now is taken by the dealer or the branch of the manufacturing company. If the dealer would properly educate the consumer to run his vehicle until it was practically worn out, he would be in a much more enviable financial position by reason of selling repair parts and labor to him at a profit rather than taking in a second-hand vehicle at a loss.

I believe it is entirely uneconomical to continue handling the sale of trucks as we are doing today. This all means a very much more efficient service arrangement throughout the United States than we have. The Detroit Motor Bus Company purchased second-hand motor buses from the Fifth Avenue Coach Company, which had run them 171,000 miles, and these are still doing business and will do business up to 300,000 miles, and then would only be scrapped because they may possibly be obsolete. In other words, we must get the maximum use and the maximum efficiency out of an automotive product, and that use must be got out by the original owner. The product must not be passed on to some one else, who somewhere down the line in the transaction, is going to take a serious loss.

I know of one case of a very large company doing a business of $3,500,000.00 of new units and about $200,000.00 in parts over a period of approximately three months, and on this enormous volume it showed only $12,000.00 profit, all the money being lost in trading in. This company is operating a large number of branches. There is not a dealer in the country today, if you sit across the desk and talk to him, who will not bring out the question of second-hand investment, even he is in absolute ignorance as to what to do with it.

As I analyze the situation I can see only bankruptcy and failure staring the industry in the face, unless the situation is relieved. I do not believe that the Baldwin Locomotive Company, when it sells locomotives to the New York Central, takes in any of the latter's old junk.

Federal Motor Truck Co.
M. L. Pulcher, *Vice-Pres.*
Detroit, Mich.

Rebuild Second-Hand Trucks

To the Editor:—The second-hand truck has always been the biggest drawback to the motor truck business. As far as we are concerned it doesn't affect us directly, as practically all our product is sold through dealers. At the same time we are most vitally interested in the success of our dealers and anything that is detrimental to them hurts us. There are a few cities in which we operate branches or are interested in the dealer organization, but they take a smaller share of our output than do our dealers.

I have heard this second-hand truck problem discussed time and again and have heard various ideas advanced as to the manner in which it could be handled. There have been a few places where the problem was solved in a way for a short time by auctions, but I am thoroughly convinced that the only solution to the problem is for the dealer to rebuild every second-hand truck he takes in before offering it for sale, and then selling it with a 3-month guarantee. I know this has been tried out at a few points and has been very successful. The dealers who have tried that have found that the usual second-hand truck purchaser is a "poor devil," who has a little money and some energy and wants to get a truck of his own. He usually buys it on time and, if he gets a piece of junk, it is only a question of a very few days or weeks until the machine is back on the dealer's hands. If the dealer sells him a rebuilt second-hand truck that will go out and perform, then the purchaser has something with which to make enough to provide him a living and sufficient money to meet his payments.

Of course, this second-hand truck that is rebuilt and sold on payments must bring a good price. But when that angle is brought up, the purchaser is impressed with the fact that it costs him a fair price for a truck that will perform his work, that he can not afford to take chances with his little savings, and that one or two days "falling down" on that contract he has in sight will cost him his job.

The dealer must use a reasonable amount of common sense in making the deal in which he procures the second-hand truck. If it is a piece of junk, he should allow only a junk price for it and not expect to resell it as anything but junk.

It is my opinion that, if discounts to dealers were less, they would not have a long margin to enable them to consider long trades and there would be more cash deals made. I think it will only be a question of time until all truck manufacturers and dealers will get in line and refuse to take any second-hand trucks in trade except of the make they are selling. And when that time comes, there is no question but that the factory will have a standard price, and that it will agree to take its own make of truck from its dealers at specified prices for specified ages. These trucks can all then be taken back to the factory, except where the dealer has adequate facilities for rebuilding, and they can be rebuilt and offered at a price that will make a good purchase.

Right now, when business is hard to get, it is a difficult proposition to try to talk sense. At the same time the fellow who is continuing the wild trade-in practices can not stay in business, and it will only be a question of time until those that are in business will listen to reason and do business on real merchandising bases.

Service Motor Truck Co.
Wabash, Ind. M. Cook, Secy.

Industrial Trucks To Be Discussed

A meeting devoted to a discussion of industrial trucks and their relation to the problems of port development is announced for Thursday evening, February 9, at the Auditorium, 130 East Fifteenth Street, New York. The meeting will be under the auspices of the Automobile Bureau of the New York Edison Company.

Among the speakers will be Captain John F. Kelly, Jr., who will tell of the methods used in handling freight at Army Supply Base No. 1, Port Newark, New Jersey. T. Kennard Thomson, consulting engineer, will tell the story of the development of Manhattan Island. Other speakers will be C. H. Clare, of the Mercury Manufacturing Company, and H. C. Yost, of the Yale & Towne Manufacturing Company. Stereopticon slides and motion pictures will be used to illustrate the talks.

The publishers are in need of three copies of the May and June 1920 issues of Power Wagon and will pay the published price for them. Readers who have no further use for these numbers are requested to communicate with the Circulation Department at the main office.

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Smith Cushion Wheel

Smith Wheel, Inc., of Syracuse, New York, has been introducing for some time, as an addition to its line of metal truck wheels, the Smith cushion wheel, in which are embodied novel features determined after long and painstaking research and experimental development work. The manufacturer has brought to this device an experience of a half-century of founding and of many years of successful metal wheel making. The company is now establishing a distributing system in the most important centers of truck application and will be prepared to render complete service to truck users in those places and the surrounding territories.

The Smith cushion wheel is composed of but four parts: the wheel, the cushion, an outer channel, and a locking ring. A single casting of eight hollow spokes and a hollow fell comprise the wheel, the felly being supported by internal braces connecting the inner and outer walls throughout the entire circumference. The metal thickness is 3/16 inch and its composition is of a special nature which permits of permanent expansion in the heat-treating process, and consequent elimination of shrinkage, casting strains and crystallization of the metal.

The cushion is of the live rubber, of one piece, slightly smaller in circumference than the outer surface of the wheel proper, and is applied to the wheel under heavy pressure. At frequent and regular intervals the cushion contains holes, extending through from the top, 1¼ inches in diameter at the top and tapering down to ⅞ inch. These holes tend to decrease weight, increase the resiliency of the wheel, permit air radiation along the cushion, thereby keeping it cool and retarding deterioration, and serve as pockets in which are fitted depressed portions of the outer channel surface. This last feature automatically locks the cushion securely and prevents its creeping around the wheel.

The outer channel is of ¼-inch cold-rolled steel, made to S. A. E. standard dimensions to accommodate any standard type of pressed-on or cushion truck tire. It is the knobby inner surface of this channel which locks the cushion, as explained in the foregoing paragraph.

The locking ring holds the cushion in place at the side, but is easily removed for disassembly of the wheel. It is split, and after application is connected at the open ends with a small tie-plate and four bolts.

Simplicity has been the keynote in the design of the Smith cushion wheel. There are no bolts or nuts to loosen, no wood spokes or sectional fellies to shrink or swell; the weight is greatly decreased through lightness of metal and fewer parts.

Mexican Automobile Show in 1922

The Automotive Group of the American Chamber of Commerce at Mexico City has definitely decided to hold a motor show in Mexico City from April 16 to 23, 1922. The show will be open to all dealers in the United States and Mexico, and to all makes of automobiles, trucks, and tractors of all countries.

Motor Truck Keeps Large Ice-Plant Working

By E. M. HATCH

Chief Engineer, Consumers' Hygienic Ice Company, Union Hill, New Jersey

WE ARE in the wholesale ice business, and operate a 250-ton plant, having three 300 horse-power boilers and three of 150 horse-power. We supply retailers in the small towns around here. Our customers come with their own trucks and haul the ice away, so we have no deliveries to make. We formerly operated our boilers with coal; but in May, 1920, we changed over to fuel oil, because a careful study proved it to be more economical and dependable. With oil there is no coal or ashes to handle, so that one man now takes care of the six boilers, whereas it formerly required two men.

Our coal had always been delivered to us by the coal dealers; but when we began to use oil we found we must haul it into the plant ourselves. The nearest satisfactory source of supply was in Bayonne, New Jersey, 15 miles away. As we could not get the oil company to deliver, and were not near enough to a railroad to use a siding, we decided to do our own hauling.

We purchased a 5-ton Selden truck in May, 1920, and equipped it with a tank holding 1,800 gallons. Later on we put a steam coil in the tank for the purpose of thawing out the load in winter, if it got frozen. The oil is very stiff and thick even in summer. This steam coil took up some space, so the present capacity of the tank is 1,725 gallons.

During the 4 summer months when our work is the heaviest, this truck makes 4 trips a day to Bayonne, and brings back 6,900 gallons of oil. In general these four months are June, July, August and September, but the exact period varies slightly, depending upon the weather. For a few weeks preceding and following this period our work is not quite so heavy, and for about three months a year 3 trips a day suffice. For the remaining five months the truck hauls only 2 loads a day.

It takes around 3½ hours to make the 30-mile round trip. When we are making four trips a day we have 2 shifts of drivers, one starting out a 7 o'clock in the morning and quitting at 5 in the afternoon, when the other relieves him and works until 3 o'clock in the morning. When we make 3 or 2 trips a day, we use only one shift.

We have 3 of these storage tanks, each with a capacity of 15,000 gallons. When all these are full they contain enough oil to last us for 10 days. Since there is no other way to get oil to our plant, this means that, if our truck were laid up more than ten days, it would force us to shut down.

We maintain the truck carefully and do most of our own repair work. This 5-ton machine costs us an average of $32.86 a day, .06 cents per gallon, and .04 cents per gallon-mile. These are very low costs for a truck that is averaging over 90 miles a day, using two shifts of drivers part of the time.

In the winter the truck has always managed to get through the snow without difficulty. We had one bad storm, but the truck made its regular trip just the same. Our present drivers are experienced men, who take very good care of the truck, and drive skillfully and carefully. They are assisted by the governor on the engine which prevents overspeeding.

The following figures will prove interesting:

Days operated	339
Total round trips	1,021
Gallons of oil carried	1,761,225
Miles traveled	30,630
Average round trips daily	3
Average gallons per day	5,196
Average mileage per day	90.3
Total variable charges	$6,881.21
Total driver's wages	3,178.50
Total fixed charges	1,080.24
Total costs (339 days)	11,139.95
Average cost per day (90 miles)	32.86
Average cost per mile	.36
Average cost per gallon hauled	.006
Repair cost per mile	.023

Street Improvement in Chicago

Paved streets in Chicago, the best paved city in the United States and Canada, if built in a straight line, would make a paved roadway 40 feet wide, reaching from Lake Michigan to Seattle, Washington. And this figure does not include Chicago's 78 miles of boulevards and 151 miles of park drives which connect the city's belt of parks. Many American cities, and almost all European ones, are without alleys. Chicago's alleys, if built in a straight line, would extend to New York and 700 miles to sea and the city's paved alleys would make a roadway 16 feet wide from Chicago to Columbus, Ohio.

The area of the city is approximately 200 square miles. It is, roughly speaking, 14 miles wide and 25 miles long at its greatest length and breadth. Within its boundaries are 3,257 miles of streets, of which 2,143 miles are paved, and 1,721 miles of alleys, of which only 516 miles are paved, "streets first" having been the slogan of the board of improvements for years. The board is building from 150 to 200 miles of streets each year.

In 1921 Chicago spent $2,000,000 for street-paving, laying a total of 386,000 square yards of pavement, without one cent of cost to abutting property owners. Of the paving laid last year 137,608 square yards were of asphalt, 133,304 of macadam, 41,290 of brick and 31,837 of granite block. The asphalt paving in Chicago totals 1,130 miles or 49 per cent., that of macadam is 470 or 20 per cent. and of brick 366 or 15 per cent. Other types of pavement are: Portland cement concrete, 150 miles or 6 per cent.; granite block, 118 miles or 4.6 per cent.; and creosoted blocks, 71 miles or 3 per cent.

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Hints for Maintaining Trucks on a Contract Basis

By H. T. C.

A MAN who is actively engaged in some other form of commerce does not want to be constantly worrying about the mechanical condition of his motor trucks. They are only a detail in his business, yet, perhaps, there is nothing that can cause such inconvenience and loss as a breakdown in the delivery and transport of his merchandise. It is here that contract maintenance steps in. The owner has only to arrange with a reputable and well-equipped firm who, under such a contract, will take all the responsibility off his shouldres, and it is self-evident that it is to the interest of the contractor by periodical and timely adjustment and attention to foresee and prevent those periodical breakdowns and extensive repairs to which motor trucks employed in the hard service of commerce are unfortunately liable. To this the owner may reply that he employs a skilled driver who protests his knowledge of mechanics and his ability to do "running repairs" (whatever that may mean), but can any driver, however capable, have had the experience in diagnosis or the instinct for putting his finger on weak points of the average repair-shop foreman or tester who has many vehicles of different makes passing through his hands daily and whose professional reputation is at stake.

The driver labors also, very frequently, under the disadvantage that he has many other things to look to besides his machine. He is generally (I am thinking now of the average merchant's light truck which are numbered now by the thousands in all parts of the country) responsible for the safe keeping and delivery or collection of the goods which he carries, in many cases he is a salesman and has to sell his load and collect cash, and is interested to the extent of a small commission. In others he is a traveler and has orders to negotiate and samples to think about—no wonder the poor truck gets little consideration, grudgingly given, until what would have been a $2.00 adjustment had anybody noticed it wanted doing, soon becomes a $25.00 or $75.00 repair and the vehicle is laid up for a week perhaps with the loss of its earnings to be added.

I think I have proved the advantages of contract maintenance from the owner's point of view, whether he be the proprietor of one or more vehicles up to say, seven. If he uses more he may consider if it may not pay him to equip his own repair-shop. But a private repair-shop may easily defeat its own ends by becoming a heavy and indefinite source of expense, while with contract maintenance the expense for the contract period is known to a penny and all work is shifted to the contractor.

Having reviewed the subject from the business owner's point of view, let us now look at it from that of the repair-shop proprietor. Is it to his advantage, or not, to arrange maintenance contracts? The answer is undoubtedly in the affirmative, the genuine dealer is out to give the best service possible and he knows that the contented owner is a standing recommendation to truck use generally and to his repair work in particular.

Experience shows that in the average repair-shop work is very fluctuating, for some days it may be difficult to find all the men jobs, then a rush of work will make overtime necessary for a week. This is bad, as one is tempted to employ more men than are really needed to cope with the periodical rushes, but if one has a certain number of vehicles which one is maintaining under a contract, work on them can be conveniently arranged to fill the slack periods and keep the men fully employed.

Another advantageous feature is that contract maintenance assures to the dealer a certain income. This must not be confused with a certain profit, that, of course, must depend on the technical knowledge and business abilities of the dealer in arranging his contracts; but it is very comforting and encouraging to know that for the next twelve months one has a certain sum coming in regularly, when one can employ all one's capital, say, in the purchase of display vehicles a big reserve at the bank for contingencies not being necessary. Book-keeping and accounting are simplified and multitudinous invoices for small adjustments and specifications for bigger repairs are boiled down to a periodical (say monthly) list of work done and report in the general condition of the truck.

It is not every vehicle that is suitable, from the repairer's point of view, for a maintenance contract; the very old machine is always a speculation and should only be taken on at a price commensurate with the risk. With some makes spare parts are difficult or impossible to obtain, which applies also to the old type machine. Some of the better trucks are very suitable subjects, spares are cheap and easily obtained and are really interchangeable, so that, given a workshop suitably equipped, highly skilled labor is reduced to a minimum, and the charges for different repairs having been practically standardized for this type of vehicle the estimation of a contract price is more easily arrived at.

If one is without experience of this class of business the best way to commence is, when one has a suitable locally-owned vehicle in for repairs, to make a careful examination of its condition and, after calculating for what sum one can keep it in good running order for twelve months, to approach the owner and ask him if he knows accurately what his truck costs him annually in repairs. He probably has no very exact idea, but make him your offer and leave him to think it over. Follow it up with a confirming letter and a contract on the lines given in the last issue. When next you call on him, he will be, if not ready to accept the contract, at any rate willing if not eager to discuss it further.

Contracts should not be made for less than twelve months; it is not fair to either party. You may get an extensive repair early in the contract which will need several light months to recoup you for the expense, or a failure may occur immediately after the termination of a short contract when no repairs have been necessary which, however impossible it was to forsee, the customer is sure to put down to your neglect during the contract. Payment should be arranged in equal monthly or quarterly sums, and every effort should be made to add to the number of contracts, as it is then possible to organize the work and inspection service and reduce the proportional overhead charged to each vehicle considerably. Also, bad luck with one or two contracts might lead to irrecoverable loss, but with a number of vehicles the balance is almost sure to be on the right side unless grave miscalculation has been made in estimating the cost.

This brings us to the question of price. So many factors enter into this question—type, age and condition of vehicle, the loads it will carry, the average daily mileage, the skill of its usual driver, etc.—that it is impossible to give any useful figures. If the dealer kept a systematic record of all his repair jobs and their cost it will prove of immense help. If he has nothing of this sort in connection with his repairs it is imperative that he initiate some complete and instantly accessible record of all work done to a vehicle under a maintenance contract, both for his own and his customer's satisfaction.

Experience has proved that it is not advantageous to include repairs to the body, unless it be of a simple type, and of course, tires are not included. Try to arrange contracts so that they, or several of them, do not all terminate at the same time, for several reasons, the chief of which is that it would be inconvenient to have to arrange all the renewals together when one might have other urgent business as well. If you are losing on a contract do not give less attention, but scrupulously carry out your part of the contract and so assure the renewal when you should be able to make good your loss, besides, the owner will note that he is getting good value for his money and his recommendation may bring other business, while a report in the district that you were not keeping your part of the agreement would be fatal to your reputation.

Ever bear in mind that the basic principle of contract maintenance is to prevent the necessity of expensive repairs (except from accident) by advice to the owner and driver and by periodical inspection and adjustment or renewal of worn parts, and it is in this point that its advantages lie, as the repairer, by his superior knowledge, can, while retaining a margin of profit, reduce the cost of repairs to the owner.

Convert Railroad to Motor Use

The proximity of the Manchester manufacturing center to the great seaport of Liverpool, England, has led to such a rapid development of motor transport in Lancashire that it has been suggested that an existing railroad should be converted into a motor road. At present three separate lines connect the two cites.

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9,245,195 Motor Vehicles Now in Use

By ANDREW P. ANDERSON
Highway Engineer, Bureau of Public Roads

A TOTAL of 9,245,195 motor trucks and passenger-cars, and also 28,114 trailers and 177,234 motor-cycles were registered in the 48 states and the District of Columbia, during the six months, January 1 to July 1, 1921. As the result of these registrations and the licensing of chauffeurs, operators, etc., the several states collected during this period a total gross revenue amounting to $108,213,165.33.

While the present registration figures are not fairly comparable with those for the year 1920, it is interesting to note that on July 1 of 1921 there had been registered 13,244 more cars, but 61,868 less motor-cycles, than were registered during the entire year 1920. Of the several states 21 already show an increase over and above the total registrations for 1920, while only 12 states show a decrease of more than 5,000 cars each. This decrease is probably due in part to leniency in enforcing the registration provisions during the present financial depression and in part to the fact that not a few people owning trucks or cars have found it financially impossible or inadvisable to operate these vehicles and have let them remain in the garage.

At the present time every state requires an annual registration of all trucks or passenger vehicles and motor-cycles before they can be used on the public roads. Minnesota, the last state to require annual registration, passed such an act last year which became effective on April 15.

The total registration revenues collected in 1920 amounted to $102,546,212.25. The registration revenues collected to July 1 of 1921 amounted to $108,213,165.33, an increase of $5,666,953.08 over those collected for the entire year 1920. Of the 1920 registration revenues a grand total of $97,671,742.10, or 95 per cent. of the gross receipts, was available for road work. Of the registration revenues collected during the first six months of 1921, $101,793,416, or 94 per cent. of the gross receipts, is available for road work, either by the state highway departments or the local road officials. This apparent percentage decrease is due to the fact that in some states the funds do not become available until the close of the year. Of the total devoted to road work in 1920, 79 per cent. was expended by or under the supervision of the state highway departments. During the first 6 months of 1921 this proportion had increased to 81 per cent.

The motor vehicle has also proved to be an indirect source of road revenues in a large number of states. Prior to 1921, Colorado, Kentucky, New Mexico, and Oregon had levied a tax on gasolene. During 1921 the states of Arizona, Arkansas, Connecticut, Florida, Georgia, Montana, North Carolina, Pennsylvania, South Dakota, and Washington passed a gasolene tax, while other states have the question of passing such a tax under consideration. The State of Louisiana has written such a measure into its new constitution.

Only 13 states gave definite information as to the sizes of the trucks registered. These data are given in Table I. They are, however, not directly comparable due to the following reasons: So far as legislative registration enactments are concerned there is as yet no universally accepted standard as to what constitutes a motor truck. In some states all motor-cars are registered on the same basis; in others only cars having solid tires are classed as trucks, while in others all motor vehicles used for carrying freight or merchandise of any kind whatever, are classed as trucks. Even those states which provide for a separate registration for motor trucks do not employ the same basis for designating the size of the vehicle. Some states use the total weight of the loaded vehicle, others the weight of the unloaded vehicle or the weight of the chassis, and still others use such indefinite basis as the horse-power, or the cost of the vehicle.

It is interesting to note, however, that in the 10 states reporting a total of 91,488 truck registrations based on rated carrying capacity, 46.8 per cent. of the vehicles were 1 ton or less, 48.2 per cent. were between 1- and 3-ton, 4.6 per cent. between 3- and 5-ton, and only 0.4 per cent. over 5-ton capacity. Two states having a total of 50,672 truck registrations based on the total loaded weight of the vehicle show the following grouping: One ton or less, 53 per cent.; 1 to 3 ton, 29 per cent.; 3 to 5 ton, 11 per cent; 5 to 8 ton, 6 per cent.; and above 8 ton, only 1 per cent. One state having a total of 51,503 truck registrations based on weight of chassis shows the following grouping: Between 1 and 3 ton, 81.8 per cent.; between 3 and 5 ton, 17.7 per cent.; and only 0.5 per cent. over 5 ton.

The registration of passenger-cars, motor trucks, taxicabs and 'buses, trailers, motor-cycles, registrations and transfers, owners' and chauffeurs' licenses, manufacturers' and dealers' licenses, total gross revenues and also the portion of these revenues available for road work by or under the several state highway departments and local road officials, respectively, are given in Table II on page 30. Nine states still fail to segregate their registration data so as to show the number of trucks within their borders. Only 7 states and the District of Columbia reported the number of taxicabs and 'buses, and only 19 states had any data as to the number of trailers.

Motor Vehicles in Germany

A recent census of motor vehicle use in Germany discloses some interesting facts, such as the high ratio of street-cleaning machines to the total number of motor trucks, and the relatively small number of trucks compared with England. The figures, which are of July 1, follow:

Motor Trucks:	
By type—	
Internal-combustion	29,536
Electric	858
Steam	30
Total	30,424
By capacity—	
1,000 kilograms and less	2,378
1,000 to 2,000 kilograms	3,796
2,000 to 3,000 kilograms	3,258
3,000 to 4,000 kilograms	7,737
4,000 kilograms and over	13,255
Motor Fire Apparatus	540
Street-cleaning Machines	264
Tractors:	
By type—	
Internal-combustion	135
Electric	73
Steam	84
Total	292
By weight—	
5,000 kilograms and less	114
Over 5,000 kilograms	178
Cars and Chars-a-bancs:	
By type—	
Internal-combustion	60,135
Electric	763
Steam	68
Total	60,966
By capacity—	
Up to 8 seats, including driver	59,588
More than 8 seats	1,378

Of the 3,600 miles of road in the Indiana state highway system, 414.7 miles are of concrete and about 200 miles more are hard surfaced with other materials. During the past fiscal year which ended September 30, the state constructed 70 miles of paved road.

TABLE I.—TRUCK REGISTRATION BY SIZES.

State.	Carrying Capacity in Tons— 1 or less.	1 to 3.	3 to 5.	5 to 8.	8 to 10.	12½ or over.	Total Registrations.
Alabama	3,808	4,471	363	.....	...	..	8,642
Arizona	2,880	533	60	2	...	..	3,475
Connecticut[1]	(2)	21,298	2,001	272	...	..	23,571
Maine	4,146	625	287	1	...	..	5,069
Minnesota[3]	9,000	4,000	.....	.....	...	..	13,000
Nebraska[4]	12,000	3,000	998	.....	...	..	15,998
New Jersey[4]	14,549	10,268	4,745	2,948	564	..	34,074
New Mexico	844	281	52	1	...	..	1,178
Pennsylvania[5]	(2)	42,095	9,122	286	...	..	51,503
South Carolina	4 60	1,749	63	.....	...	..	6,572
South Dakota[1]	.3)	[6]7,742	[7]64	.....	...	..	7,806
Vermont	2,474	549	55	3	1	3	3,085
Wisconsin	14,965	2,899	[8]1,235	.....	...	..	19,099
Total	69,426	100,520	19,045	3,513	565	3	193,072

[1]Data for year 1920. [2]Included in column "1 to 3." [3]Data approximate. [4]Distribution based on total loaded weight. [5]Distribution based on weight of chassis. [6]Two tons and less. [7]Between 2 and 5 tons. [8]Three tons and over.

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Concerning "A Normal Year"

We have received a great many favorable comments on an editorial, "A Normal Year," which appeared in the January issue. The following extracts are taken from a few of more than a hundred letters received:

"In my opinion you have hit the nail squarely on the 'bean.' Reports have been exaggerated, and I feel sure that the article that appeared in your publication will have a very wholesome effect."—Robert C. Rueschaw, Sales Manager, Reo Motor Car Company.

"I want to compliment you on your leading editorial, as I think it is a very good article."—Forrest J. Alvin, General Manager, United States Motor Truck Company.

"Splendid and constructive."—B. A. Gramm, President, Gramm-Bernstein Motor Truck Company.

"The writer has read your editorial with much interest and thinks it is a sane presentation of the subject. We had quite an experience during the year or year and a half when it was impossible to furnish as many trucks as required by our dealers. During that period we endeavored to 'put over' the idea of selective selling, trying to get our dealers to select the trade to which they would deliver trucks and allow the undesirable trades to go by the board. We found that we were entirely unsuccessful in this attempt, and yet, if dealers all over the country had followed out the idea, they certainly would have been in far better shape when the slump came, instead of being compelled to take back truck after truck because they had been sold to men operating on a 'shoe-string' rather than to reliable business organizations."—C. J. Helm, Sales Manager, Acme Motor Truck Company.

"Your editorial, 'A Normal Year,' is a very well written and timely article. Certainly the year 1921 was not so bad for motor car production when compared with 1914, for instance, but one thing which made it appear worse was the fact that so many new motor truck manufacturers of the mushroom variety came into existence on the flood-tide of war orders, and they have caused great discomfort to the old-established manufacturers."—A. S. More, President, Denby Motor Truck Company.

"'A Normal Year' is undoubtedly timely and carries a message which it is well that business men generally may hear and heed."—W. A. Olen, President, Four Wheel Drive Auto Company.

"I agree with it ['A Normal Year'] completely."—W. L. Day, President, General Motors Truck Company.

"This article was very interesting and I think you are working along the right lines. It strikes a familiar chord."—E. A. Williams, President, Garford Motor Truck Company.

Swiss Truck Situation

Switzerland does not offer great opportunities for the sale of motor trucks at present owing to the severe competition offered by Swiss machines and those of other European countries. Many trucks from foreign army stocks were dumped on the Swiss market, several manufacturers were forced to liquidate and dealers' floors were full of unsold machines. During the past year the principal territories open to Swiss machines were Spain, Belgium and Rumania and the sales were principally of trucks, which have an excellent reputation for service. Six brands are now being produced: the Arbenz, Berna, Franz, F. B. W., Martini, and Saurer.

On August 31, 1921, there were 4,839 trucks in the country and 13,172 passenger-cars, including omnibuses. In 1916 there were but 1,154 trucks, in 1917 there were 1,412, in 1918 only 1,633, but in 1920 the number had reached 3,674. American-made trucks rank fifth in point of number.

TABLE II.—MOTOR REGISTRATIONS AND REVENUES, JANUARY 1 TO JULY 1, 1921.

State.	Total, Trucks and Cars.	Passenger-cars.	Taxicabs and Trucks.	'Busses.	Trailers.	Motorcycles.	Re-registrations or Transfers.	Owners' and Chauffeurs' Licenses.	Manufacturers' and Dealers' Licenses.	Total Gross Registration and License Revenues.	Revenues Available for Road Work: By State Highway Department.	Revenues Available for Road Work: Under Direction of Local Authorities.
Alabama	78,761	66,252	8,867	3,642	.....	778	.....	4,544	1,350	$897,378.67	$874,663.27	.....
Arizona	30,175	[1]26,328	[2]3,475	[4]372	.....	376	743	31,045	219	187,434.75	187,434.75	.....
Arkansas	58,676	58,287	[3]389	.....	8	136	261	242	397	615,000.00	187,500.00	$430,500.00
California	588,863	557,231	31,632	.....	2,661	15,161	90,840	801,515	2,475	6,215,936.82	2,706,652.28	2,706,652.28
Colorado	119,867	112,783	7,804	.....	38	2,103	4,124	118,119	2,176	789,080.47	357,138.42	357,138.42
Connecticut	114,643	93,548	[4]21,095	.....	.....	2,759	9,878	132,248	695	1,876,444.58	1,876,444.58	.....
Delaware	18,800	18,800	([5])	.....	56	500	.....	21,416	564	338,804.00	338,804.00	.....
Dist. Columbia	42,377	[6]35,654	[7]5,448	1,275	.....	2,487	.....	16,972	.....	298,404.25	.....	.....
Florida	89,795	76,323	13,345	127	([8])	1,153	1,713	2,236	699	701,589.00	96,273.22	545,151.51
Georgia	118,652	118,652	([5])	.....	.....	1,023	238	3,739	618	1,598,355.30	1,598,355.30	.....
Idaho	46,035	46,035	([8])	.....	.....	750	.....	46,663	348	[9]726,404.25	145,280.85	508,482.97
Illinois	580,345	512,541	67,804	.....	.....	7,243	.....	61,027	6,511	6,238,326.70	6,221,282.05	.....
Indiana	344,890	309,450	35,440	.....	1,401	5,739	10,002	7,170	1,379	2,151,543.00	2,151,543.00	.....
Iowa	435,356	[10]407,084	28,272	.....	313	3,406	108,000	6,790	1,687	7,343,051.32	6,792,326.00	.....
Kansas	287,393	267,933	19,460	.....	.....	3,398	10,045	287,393	2,166	1,430,180.50	.....	1,275,453.00
Kentucky	103,493	94,414	9,079	.....	.....	1,034	.....	7,680	700	1,672,587.25	1,672,587.25	.....
Louisiana*	71,000	64,000	7,000	.....	.....	490	.....	.....	.....	426,000.00	.....	383,000.00
Maine	66,133	57,874	8,259	.....	.....	1,172	3,252	82,013	712	865,688.75	658,018.75	.....
Maryland	132,273	122,550	9,472	251	195	[11]4,062	5,648	27,621	3,016	2,031,535.86	1,422,075.00	.....
Massachusetts	300,027	250,778	49,249	.....	401	10,013	.....	204,399	1,758	3,842,593.25	[12]1,858,250.00	.....
Michigan	426,460	[13]382,432	[14]44,028	.....	3,382	5,252	17,002	56,349	1,680	5,963,228.16	2,883,004.15	2,883,003.31
Minnesota	283,000	[15]270,000	13,000	.....	7,684	3,000	.....	1,700	1,350	4,795,526.00	4,795,526.00	.....
Mississippi*	56,114	48,100	8,014	.....	.....	122	.....	.....	.....	700,000.00	650,000.00	.....
Missouri	305,802	[16]305,802	([5])	.....	.....	3,081	8,464	327,201	2,045	2,236,392.00	2,236,392.00	.....
Montana	51,500	51,500	([5])	.....	.....	373	208	453	255	530,617.50	238,777.87	238,777.87
Nebraska	215,909	199,861	16,048	.....	232	1,419	7,072	.....	2,193	2,652,933.98	1,920,060.96	640,020.32
Nevada	8,688	8,688	([5])	.....	.....	104	.....	.....	73	96,548.85	95,798.85	750.00
N. Hampshire	37,170	37,170	([5])	.....	.....	1,919	.....	34,400	270	540,967.14	508,328.64	.....
New Jersey	237,339	214,940	22,399	.....	759	8,295	.....	295,008	2,853	3,464,938.85	3,194,938.85	.....
New Mexico	19,661	18,483	1,178	.....	.....	152	500	.....	.....	183,173.72	178,592.74	.....
New York*	675,530	505,642	144,888	25,000	4,000	22,580	([5])	.....	.....	9,000,000.00	6,750,000.00	2,250,000.00
North Carolina	147,910	133,846	14,064	.....	([5])	1,534	.....	.....	1,116	1,680,000.00	1,680,000.00	.....
North Dakota	86,310	84,942	1,368	.....	.....	676	3,419	.....	.....	632,241.00	176,120.50	176,120.50
Ohio	628,283	[17]547,000	77,000	4,283	4,775	[18]23,300	.....	.....	3,837	[19]6,000,000.00	3,000,000.00	3,000,000.00
Oklahoma	177,300	168,300	9,000	.....	.....	628	.....	.....	772	2,130,992.50	[20]1,924,546.75	.....
Oregon	102,274	102,274	([5])	.....	.....	2,486	8,889	29,747	489	2,153,843.75	1,500,000.00	500,000.00
Pennsylvania	609,268	557,765	51,503	.....	1,560	18,174	38,117	237,505	13,547	8,387,106.05	8,387,106.05	.....
Rhode Island	46,574	37,676	8,898	.....	16	1,524	.....	33,230	.....	604,654.00	574,654.00	.....
South Carolina	82,447	[21]75,875	6,572	.....	44	643	698	.....	649	703,655.52	562,924.41	.....
South Dakota	117,800	110,000	7,800	.....	.....	750	2,410	.....	1,000	750,000.00	.....	680,000.00
Tennessee	98,924	86,610	12,314	.....	.....	845	2,064	.....	449	1,203,944.08	1,168,610.36	584,305.17
Texas	412,332	[22]412,332	([5])	.....	.....	3,219	71,851	12,507	2,030	3,423,802.29	1,671,669.16	1,670,751.57
Utah	41,136	35,730	5,406	.....	.....	792	.....	42,827	186	385,053.05	355,194.55	.....
Vermont	32,871	29,786	3,085	.....	([8])	847	1,812	40,025	245	594,562.55	572,733.72	.....
Virginia	124,000	110,000	14,000	.....	.....	1,800	5,000	4,500	3,000	1,800,000.00	1,700,000.00	.....
Washington	162,287	136,205	23,374	2,708	577	2,924	4,654	.....	812	2,642,831.51	2,518,131.51	.....
West Virginia	91,204	78,002	[23]13,202	.....	.....	1,220	.....	9,617	1,092	1,076,279.86	2,076,279.86	.....
Wisconsin	315,864	296,765	19,099	.....	.....	5,505	8,000	.....	2,040	3,373,000.00	2,429,066.39	809,688.79
Wyoming	23,684	21,184	2,500	.....	12	287	200	.....	204	260,534.25	260,534.25	.....
Total	9,245,195	8,363,427	844,110	37,658	28,114	177,234	425,104	2,996,901	69,657	108,213,165.33	82,152,620.29	19,639,795.71

[1]Does not include 109 nonresident passenger-cars. [2]Does not include 6 nonresident motor trucks. [3]Registration became effective May 1, 1921. [4]Includes motor 'busses and trailers. [5]Included under passenger-cars. [6]Does not include 16,979 nonresident passenger-cars. [7]Does not include 1,528 nonresident motor trucks. [8]Included under motor trucks. [9]To June 1. [10]Does not include 821 nonresident passenger-cars. [11]Does not include 2,053 motor-bicycles and side-cars. [12]Appropriations made annually by legislature. *Estimated. [13]Does not include 198 nonresident passenger-cars. [14]Does not include 216 nonresident motor trucks. [15]Does not include 200 nonresident passenger-cars. [16]Does not include 268 nonresident passenger-cars. [17]Does not include 82,798 nonresident passenger-cars. [18]Includes side-cars. [19]Approximate. [20]Distributed under counties but expended under supervision of State Highway department. [21]Does not include 50 nonresident passenger-cars. [22]Does not include 339 nonresident passenger-cars. [23]Includes taxis, 'busses, and trailers.

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Railroads Look for Help in Motor 'Buses on Rails

LARGE RAIL MOTOR CARS ARE COSTLY

Light local passenger service is undoubtedly the most expensive luxury in proportion to the returns that the railways can offer the public. Whether it be the daily branch line "turn-around" or the main line "short-dog" that must be maintained at the mandate of a state commission, it results usually in a very meager return, while the expense of operation is often considerable, says a writer in the *Railway Review*. This is particularly true where a steam locomotive is used to haul a couple of passenger coaches. Under these circumstances it is seldom that the fuel consumption is less than 400 pounds of coal per car-mile while a full passenger and engine crew must be employed. Locomotives retained in this class of service are invariably old and decrepit so that the cost of their maintenance usually runs high.

Branch lines are seldom built for their passenger traffic possibilities but, once constructed, passenger service is demanded and must be constantly operated even after the original freight prospects may have become exhausted, so that these branch lines frequently transpire into white elephants on the hands of the owning railroads. Some years ago large gasolene-driven cars entered the market and, subsequently, gasolene-electric cars were substituted for light passenger trains on many railways. Admirable and elegant in construction as these cars proved to be, their first cost in many instances approached that of a new locomotive and the intricacies of their mechanism often demanded a large share of official attention from the chief electrical engineer down.

Faced with these discouraging circumstances in the operation of light passenger service, it has been particularly galling to railway management to observe the motor truck and 'bus thriving on the very traffic that had caused the railways an actual loss. This situation has naturally been aggravated in the minds of railway managers by the fact that the motor is being run over a road built and maintained by the taxpayers which, of course, includes the railways in large measure. It is as futile, however, to argue against the inroads which the motor truck has made upon rail traffic or to suggest the prohibition of this traffic as to remonstrate against the rapid spread of a forest fire.

"The most effective policy is to fight fire with fire," he says. "English railways use the motor truck extensively as a means for supplementing freight service, and there are many in this country who have the temerity to suggest that if the truck is taking traffic from the railways at a profit, that the roads should themselves engage in this business, not only as a means for improving their service, but as a means for improving their earnings. But to return to that particularly onerous phase of the situation cited in the operation of light passenger trains, a very plausible remedy is suggested in the form of a rail motor 'bus.

"Following closely in detail the main features that are responsible for the successfull performance of the motor truck, it may be assumed a rail 'bus can be constructed which embodies the same elements of simplicity in construction, reliability in performance, flexibility in operation, light weight and low first cost. It is possible that if the rail motor 'bus is to be successfully operated as a substitute for the light passenger train in main-line service as well as on branch lines, that a maximum speed of more than 30 miles per hour should be attainable, but it is believed that, if designed to meet various local conditions, the field for a light gasolene rail car patterned after the motor truck affords many interesting possibilities in the direction of economy and better service."

Reduced Licenses in England

Under the Road Vehicles Legislation and Licensing Regulations of England for 1921, automobiles are assessed at the rate of $5.00 per horse-power per annum, and licenses may be taken out for a period of one year or for three months only. In the latter case the cost is three-tenths of the full annual duty.

A new Road Vehicles (Part-Year License) Order, effective from January 1, 1922, has been issued, whereby the cost of licenses will drop—in the case of yearly licenses, with the progress of the year, and in the quarterly licenses, with the progress of the three months—in accordance with the following scale, as illustrated by the tax on a 20-horsepower automobile:

Month of Application.	License Expiring Dec. 31. Amount.	License Expiring End of Quarter. Amount.
January	$100	$30
February	100	20
March	90	10
April	80	10
May	70	20
June	60	10
July	50	30
August	50	20
September	40	10
October	30	30
November	20	20
December	10	10

This new scheme is likely to have a beneficial effect on the sale of American vehicles in the British market, at least indirectly, as the present system of taxation was working a considerable hardship on the importer in that it "bunched" sales, and purchasers often held off until the later quarters of the year as a measure of taxation economy. Under the new system sales should spread more uniformly over the whole year and help relieve the tax burden, which has been more of a disadvantage to the high-powered American machine than to the local product.

Tractors in Lumber Camps

Adirondack lumbermen are using tractors for log-hauling this winter to a greater extent than ever. Last season several of the largest lumbering companies used tractors for the first time and found that one of the machines would do the work of several heavy teams of horses. The tractors practically make their own roads and are able to haul out the logs, several big sled-loads at once, by the shortest possible route.

Tractors and Trailers Simplify Transfer Work

PRACTICALLY DOUBLE TRUCK CAPACITY

In our larger cities where hundreds of express-laden trains arrive and depart every day, terminal transfers of express matter have presented a most serious problem. As the work consists of an almost continuous loading and unloading process, the motor trucks and horses which have been engaged in such transfer duty are unavoidably idle a good part of the day. In order to reduce this unproductive time and also facilitate the movement of expressage, the American Railway Express Company has adopted tractor-trailer equipment with what has been considered unusual success.

Several months ago this company added to its Chicago equipment four 5-ton Mack tractors and 14 semi-trailers of 3½-ton capacity. Chicago's transfer traffic at that time was severely taxing its old equipment, for it had grown to an average of 2,800 double wagon-loads each 24 hours in addition to about 1,000 loads of local outbound business which had to be hauled daily from various billing stations to the railroad terminals. One of the first benefits derived from the new equipment was the rapid clearing of terminals, where before traffic jams had been a constant worry.

By backing an empty trailer up to an express car and loading it directly by hand trucks a considerable saving was effected both in the amount of warehouse space required and the number of handlings involved. In addition to this the tractors were, of course, continually on the road, since an empty trailer could be detached and loaded while the tractor hooked on and hauled another to its destination. Each tractor hauled about 36 full loads every 24 hours an average distance of about 2 miles—practically double the number of loads previously handled by 3½-ton trucks and more than three times the number hauled by horse-drawn vehicles.

After the new system had been in operation for some time, costs were compared, and it was found that while the cost per hour for one tractor and four trailers was $2.13, as compared with $1.93 for the 3½-ton gasolene truck, the tractor-trailer method handled 295 loads in a period of 10 days, while the motor truck for the same time averaged only 122.7 loads. The result showed that the cost per load by the new method was $1.42, while the motor truck cost $3.09 and the horse-drawn vehicle $3.69.

These gratifying results have led the American Railway Express Company to increase its Chicago equipment to 6 tractors and 19 trailers. It has also installed in Philadelphia a fleet of 5 Mack tractors, each with a family of semi-trailers, and 4 Mack tractors in the city of Boston.

The number of trucks in service in the province of New Brunswick, Canada, has increased steadily. In 1918 there were 252 motor trucks in use, in 1919 there were 412, in the following year there were 659, and in 1921 the number had grown to 875.

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Motor Delivery Holds Trade for Brass Foundry

By C. A. GOLDSMITH
Proprietor, C. A. Goldsmith Brass Foundry, Newark, New Jersey

WHEN customers want goods in a hurry, our motor truck holds the business by guaranteeing rapid delivery. We have one of the largest general jobbing foundries making brass, bronze, and aluminum castings in Greater New York. Most of our customers are manufacturers who find that we can make such castings better and at a smaller cost than they can make them. As they depend upon our regular deliveries to keep production flowing smoothly in their plants, we cannot afford to have any but a dependable delivery service.

Our truck makes 3 trips a week to Trenton, traveling 112 miles on the round trip. The rest of the time it makes local trips around Newark, and to Plainfield, Elizabethport, Jersey City, Bloomfield, Elizabeth, and Nutley. On these runs it averages about 30 miles a day, and makes 2 trips. On the trips to Trenton the truck—a Garford—usually starts early enough in the morning so that it can get back before dark. This considerably reduces the chances of accident. On the haul to Trenton, the loads averaged 3,000 pounds, on the local trips they average only 1,800 pounds.

We started making deliveries to Trenton. Congested conditions made freight service too slow and uncertain. But even though freight service has improved considerably, we are continuing to deliver by truck because we have found that it is not only faster but also cheaper for a run of this length. If we ship by freight there would be 10 minutes trucking at each end; and this, added to the freight charges, would considerably exceed our present cost for making the entire trip by truck.

One of our Trenton customers often says that he patronizes us because we deliver direct to his door, giving him no worry about shipments, and enabling him to plan his work with the assurance that our deliveries will be made as promised. The same is true to some extent with all our customers. Prompt delivery makes good friends of old customers and brings new ones.

Of course, horses would be out of the question for the Trenton hauls, but they could be used for most of our local deliveries. We did not use horses up to a few years ago. Nowadays, however, people expect the rapid service given by motor delivery, and horses could never hold the business. Then, too, the cost of horses in our work would exceed our truck costs by a considerable amount.

Repair costs on our truck are kept down to an absolute minimum by careful driving and by making it a practice never to overload or overspeed. The driver spends part of every Saturday morning going over the truck and tightening it up. In this way he anticipates trouble and makes repairs before they develop into anything serious. So far actual repairs have cost only $100.00 for the year, plus the portion of the driver's time charged to inspection and maintenance. The truck has been laid up only 3 days, a remarkable record considering the long trips and steady work. Probably $200.00 a year, plus the driver's time, will take care of repairs during the life of the truck, which we figure at a minimum of 80,000 miles.

In our opinion the fact that we use pneumatic tires, and keep them well inflated, contributes much to the low repair charges. The driver carries a tire tester, and twice a day he is required to test every tire and bring the pressure up to 90 pounds if it is not already there. Repeated tests show that the truck gets 8 miles to the gallon of gasolene. The roads traveled are usually in pretty fair condition and there are no very steep hills.

Our 1¼ tonner costs $18.82 a day, 26.51 cents per mile, $11.41 per ton, and 48.19 cents per ton-mile. This is considerably less than two teams would cost us, and two teams would never be able to do what the truck is doing.

The service and inspection of the dealer's force is the most wonderful we have ever seen. They make a regular weekly inspection and give us a detailed report showing the condition of the truck and recommend whatever repairs they consider necessary. This anticipation of trouble has certainly helped us cut our repair costs. We had an example of their good service when at 8 o'clock one evening our truck ran into another one and was pretty badly smashed up. By 9:30 they had their wrecking car there and towed our truck into the garage. It took them only one day to fix it up as good as new.

Our cost records show the following details:

Operation.	
Days operated	292
Miles traveled	20,732
Miles per day	71
Miles per gallon of gasolene	8.0
Miles per gallon of oil	94.7
Itemized Cost.	
Driver cost per day	$ 5.67
Depreciation per mile	.0253
Maintenance and repairs:	
Actual, total	265.45
Actual, per mile	.0128
Estimated, per mile	.0176
Tire cost, estimated, per mile	.067
Average Cost.	
Cost per day (including driver)	$ 18.82
Cost per mile	.2651
Total cost for period	5,495.62

Nature of Trunk Road Traffic

Minnesota trunk highways are carrying an average of 565 vehicles a day—more than 26 per cent. increase over the daily average of 435 last year, and more than three times as many as 5 years ago, Charles M. Babcock, State Highway Commissioner, announced recently. The statement was based upon returns in the annual traffic census made the week of August 28, by highway department observers at 137 stations or observation points in various localities.

"Tremendous increases in the volume of traffic on Minnesota highways simply show the importance of pushing the building of better roads with all possible speed," Commissioner Babcock said. "Our roads, like those in other states, are ten years behind the demands of traffic, as is proved by the census figures. The returns made a forceful argument for speeding highway development and back its claim for popular public support."

Traffic engineers made comparisons with traffic census figures for previous years, using the 565 average for this year as the basis or 100 per cent., and found that the daily average of 435 vehicles for 1920 was 79 per cent.; that of 347 for 1919 was 61 per cent.; that of 276 for 1918 was 49 per cent.; that of 231 for 1917 was 41 per cent., and that of 174 for 1916 was 31 per cent., or less than one-third as large as that for the present season.

The engineers noted further that motor vehicles, which outnumbered horse-drawn rigs about 11 to 1 in the 1920 figures, predominate now on a 22 to 1 ratio. Increases of 37 per cent. in the number of passenger-cars and 30 per cent. in trucks are shown, together with decreases of 21 per cent. in the number of wagons and 43 per cent. in buggies on trunk routes.

French Motor Industry

The demand for trucks in France is still low, due chiefly to the stocks of army trucks which glutted the market. The number of motor vehicle makers has been increased and most of them are working at about 20 per cent. of capacity. The industry required 55,000 men to produce 53,000 machines of all kinds last year.

Motor Vehicle Shipments

Records giving the number of carload, driveaway and boat shipments of motor vehicles made during 1921 are now complete and they show for December a gain of 5 per cent. compared with the previous December and a loss of 14 per cent. compared with November. The following table reveals the comparative figures in detail:

	Carloads.		Driveaways.		Boat Shipments.	
	1920.	1921.	1920.	1921.	1920.	1921.
January	25,057	6,485	29,283	3,185	....	93
February	25,505	9,986	43,719	7,507	....	99
March	29,326	16,287	57,273	9,939	....	75
April	17,147	20,187	64,634	14,197	....	1,619
May	21,977	18,608	74,286	15,193	....	2,381
June	22,516	20,269	60,746	18,834	8,350	3,947
July	23,082	19,470	52,342	15,320	8,702	3,725
August	23,386	20,350	34,060	14,290	7,095	3,565
September	20,804	20,150	24,431	13,550	5,469	3,580
October	17,209	17,323	14,127	11,257	2,519	2,300
November	13,253	14,061	9,497	10,509	659	1,385
December	11,802	12,100	6,469	7,500	89	134
Totals	251,064	195,276	470,867	141,281	32,883	22,903

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1922 Promises Healthy Growth

By CHARLES CLIFTON
President, National Automobile Chamber of Commerce

NINETEEN TWENTY-TWO will be a year of growth. It will, one can say, be a year of expansion. By this I do not mean necessarily that there is going to be larger production. In fact, anyone who speaks of growth simply in terms of production has a very limited conception of what the industry means. Beyond a certain point essential to carry the overhead, output of new machines is secondary to other considerations.

The automotive industry may fittingly be compared to a young man who has been through a number of years of rapid physical development, who will also undoubtedly take on added weight as the years go on. The important thing for him, however, is not an addition to his bulk, but fuller use of the faculties with which he has been endowed. He must now add experience, judgment, and creative ability to his physical size.

The production of 1921 probably will not be exceeded in 1922. But this is only one particular in the scope of motor transportation. More attention will be paid to the needs of the individual owner. The repair parts business of the factories will be better organized. Governmental and other agencies will carry on studies of transportation costs which will effect owner economies. Road development will give the owner more value per vehicle. The export market will be better. In fact, if the allied debt is refunded, foreign trade will be measurably improved as the exchange rate will then readjust differences in currencies on a basis of comparative purchasing power.

In 1922 we are going to see better service to the individual owner. The industry in the past ten years has been working in the laboratory. It has been making a product new in the history of man and it has taken time to understand not only the problems of manufacture, but also the difficulties in the repair and service shops throughout the country. Many companies are giving and have given splendid service to their owners, but for the industry as a whole there is great opportunity for growth. It is a complex situation to deal with because good service to the owner is a matter of personal contact with the local man in the field.

Fortunately, time is gradually eliminating those local shops which have not served the customer well. Time also is giving the local man a chance to know what the owner wants. Nineteen twenty-two will give many factories an opportunity to study their service situations throughout the country and to aid their local dealers in giving satisfaction to the owner.

Concretely this will mean that the dealers' inventories will be better balanced so that there seldom will be delay and expense due to telegraphing the factory for parts. The owner will have a better idea of what his repairs are going to cost him. There will be increased emphasis on cleanliness and courtesy. Owners can protect themselves by patronizing authorized service stations and then, if they do not get the treatment to which they feel they are entitled, they will confer a great favor on the factories by entering a vigorous protest to the home office.

Improvement in export trade became noticeable in October. In the months preceding there had been a halting of demand in foreign markets as a direct result of the disturbed economic conditions throughout the world. The lowest level for automotive exports in 1921 was reached in July as far as trucks were concerned and in September for passenger-cars. Compared with July, the truck shipments were higher by 76 per cent. in October. The percentage of increase in case of passenger-cars was 6 per cent. over the September exports. A still greater improvement was noticed by the trade during November. Thus it is becoming evident that the curve of export trade has turned the corner and is gradually directed upward.

The real cause for optimism in foreign trade may be seen in the tendency to restore world-wide confidence. With it will be restored the exchanges to such levels that the depreciated currencies will buy, if changed into dollars, practically the same quantity of goods in the United States as they do in country of issue.

Leading financial authorities predict a prompt recovery in the truck market with the return of better general business in the spring. The essential factors in the truck situation, however, are much wider than this. Elisha Lee, vice-president of the Pennsylvania Railroad, has indicated the trend of truck transportation as follows:

"The motor vehicle and the airplane are more likely to develop new transportation fields of their own, rather than extensively to invade those of the railroads. The telephone did not wipe out the telegraph; typewriters have not eliminated the use of pens and pencils. To the extent to which motor vehicles are likely to take over the short-haul freight traffic the railroads will probably be immediately benefited financially, because short-haul business is becoming increasingly unremunerative on account of the high proportion of terminal costs which it must sustain."

We shall find in our larger representative cities motor freight terminals exercising important influences on transportation and production. Consolidations of existing motor freight lines will be brought about in the interest of the larger terminal responsibilities to the shippers. This is already in progress in New York, Rochester, Buffalo and other cities. The safe passage of goods between cities will be guaranteed by the use of armed convoy arrangements.

In many instances we shall undoubtedly find as time goes on that the railroads themselves will initiate the allocation of truck and freight-car service. The precedent has already been established by the Cascade Railway of Washington, which was recently confronted with the problem of extending its services into undeveloped territory.

If one had the privilege of taking periodic airplane rides over the country, one would find among other things that the smoke of the short-line railroads would be growing less and less apparent due to the increased use of motor 'buses equipped with flanged wheels. Closer observation would reveal that the passenger traffic is being allocated to street-cars and 'busses, as the latter have been found to make possible the extension of service into new residential and manufacturing centers.

The imminency of the realignment of transportation facilities is quite apparent. Approximately 75 per cent. of the hauling in the Texas and Oklahoma oil-fields is being carried on by means of specially designed truck and trailer combinations. There is every reason to believe that in the transportation of coal from the mouth of the mine there will be from now on a similar marked tendency to utilize power trucks. Just how extensive this movement will be may perhaps be gleaned from the fact that the products from approximately 3,300 mines are being conveyed by motor trucks or wagons at the present time. With the increase in the number of good roads within the next few years there will come about a more extensive utilization of motor trucks by the farmer, as the government estimates that he loses $300,000,000 yearly in marketing his crops on account of bad roads.

Anyone who has been shaken up on bad roads or has seen a good road fallen into disrepair may look upon 1922 with enthusiasm. The Townsend Act, enacted by Congress last fall, continues the usual hundred-million-dollar-fund for new roads. The Townsend measure, however, carries more of importance than financial aid. It specifies that the taxpayers' money be protected by a maintenance fund so that a road once built will be permanent. It also provides that money shall be spent on an interrelated system so that one driving will not suddenly come to a stop in some main highway where some particular officials' influence ended. These measures will strengthen the hand of the various state highway commissions in the efforts which most of them have made to provide a system of maximum use to the public.

State legislatures for the most part have adequate laws on their books. Barring some changes in the direction of uniformity, we need no new laws. Fewer laws and more enforcement is the keynote for 1922.

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Stop overloading. Stop reckless driving. The legal side has been cared for in most states. The problem is one of action.

I would not suggest that 1922 will be a bed of roses. It will be a good year for the owner and good in certain respects for the dealer and manufacturer. The maker and seller will be put on their mettle in a stiff competitive situation. There has been competition in price for the past eighteen months, with resulting readjustments made direct to the consumer. The purchaser, however, is not interested in price alone. In fact, within a given maximum, this is a secondary consideration. He is interested in reliability, the value of the product, local service, and prompt and courteous attention. The motor companies will face competition in these fields. The year will call for strenuous efforts, but will, however, benefit everyone in the long run.

I have compared the automotive industry to a young man, but there is one sense in which this analogy does not hold. The life of a business continues indefinitely when the individual can not.

The life of the automotive industry, moreover, has the advantage of a rebirth with every year. The national shows at New York and Chicago, followed by other shows throughout the Country, put a new spirit into the business. Then come the warm days of April, May and June with the open roads and the increasing demand for transportation by car and truck.

For those who are discouraged at the usual dullness of this time of year, I would like to offer a quotation from Shelley used for the title of a current novel and particularly applicable to our own business: "If winter comes, can spring be far behind?"

Mowe Made Vice-President

J. V. Mowe, for the past year general sales manager of the Kelly-Springfield Tire Company, has been made a vice-president of the company, continuing his interest in the selling end of the business. The new dignity, which was awarded to Mr. Mowe at a meeting of directors, comes as a natural tribute to the character of his work at the head of Kelly sales in a year which called for the utmost skill of tire executives. He is a real old timer in the tire business, his experience going back through important posts with the Kelly-Springfield company to duties of similar caliber with the Goodyear and Firestone organizations. He was at one time manager at Detroit for Firestone, resigning to join Goodyear. He was special factory representative for this company when, in 1915, he joined Kelly-Springfield, as assistant sales manager. He continued his headquarters in Detroit, and his contact with the manufacturing trade. He was called to the home office in New York a year ago, when he was placed in charge of sales for the company.

Minneapolis Trucking Terminal

The Minneapolis Truck Terminals, Inc., has been organized by fifteen of the principal companies and individuals operating motor truck freight lines in and around Minneapolis. The new corporation has established a union terminal from which the several truckers are operating 37 lines serving some fifty towns. The terminal is situated at 724 First Street, North.

"Trackless Trolleys" Will Be Used on Staten Island

ESTIMATED SAVING 3.35 CENTS A MILE

The "trackless trolley," which is an innovation in the East, was put into operation recently on Staten Island, New York, in the presence of Mayor Hylan and other New York city officials. The new system will provide communication between the villages of Sea View and Meier's Corners and the heretofore rather inaccessible Linoleumville.

C. T. Perry, electrical engineer of the Department of Plant and Structures, designed for this system a car of greater stability than had been attempted hitherto, equipped with greater motor power and with all the safety appliances developed by experience in high-speed electric traction. The electric current is supplied to the car by two overhead grooved trolley wires depending upon specially insulated hangers supported on span wires strung between poles. One wire is positive and delivers the current to the car. The other wire is negative, receiving the current passing through the motor and completing the circuit. The production of the power by the city is a feature of the operation. By certain additions to the equipment of the power-plant at Sea View Hospital it was found possible for the city to generate the power instead of purchasing the current from a private plant. This current, at 550 volts, is carried to the trolley wires by a feeder cable.

The car consists of a steel frame body with Steelosote panels mounted on a chassis frame on which are supported two 600-volt motors arranged for series parallel control. These motors are mounted on a single shaft and drive the car through a worm gear of special pitch mounted on the rear axle. The wheels are of the American cushion type with solid rubber non-skid tires.

The current is delivered from the overhead lines to the motors by means of a sliding contact supported on a single pole. This pole is divided electrically into two sections, contact being had through one section with the positive wire and through the other section with the negative wire. The pole is supported on a ball-bearing base, which allows such free play to the pole that the car can swing 9 feet 6 inches from the center line of the wires without losing contact with them. At the base of this pole is a hand maneuvering device by which the operator can raise or lower the pole or swing it from side to side to meet varied operating requirements, without leaving the car. Springs furnish sufficient tension to insure suitable contact pressure between the pole head and the wires. The car is operated by a man seated at the steering-wheel. The first contact point for operation is obtained by a foot movement, and acceleration is had by hand movement. A combined foot and hand-braking effect enables the operator to start the car easily without jar and to stop without sudden effort in case of emergency.

The interior of the car, finished in white enamel, is equipped with spring-cushion leather-covered seats for 30 passengers, with a center aisle that affords ample room for 15 standing passengers. The car is equipped with two lighting circuits, one circuit taking current from the trolley wires, the other from a storage-battery, which is charged by a generator mounted on the forward end of the armature shaft. A low potential relay cuts into circuit the emergency lights when the pole leave the trolley wire.

The springs used in the construction of the car, of high-grade silicon-manganese steel, with the spring cushions, give the car the riding qualities of a first-class motor car.

The car can easily maintain a speed of from 20 to 25 miles per hour on a level road.

The cost for single track trolley construction per mile varies from $37,000 to $60,000, according to the nature of the roadway that has to be torn up and relaid. The cost for trackless construction is approximately $4,000 per mile. The trolley system destroys the roadway; the trackless system does not. Its wear and tear on the roadway is no more than that due to motor vehicles.

"We have studied out all the elements of cost, including initial investment, maintenance, depreciation and operation," according to Mr. Perry, "and have found that the cost per car-mile of the trackless system figures less than the cost of one-man trolley operation and less than the cost of 'buses. The figures are as follows:

Standard safety car, per car mile	24.3
'Bus	29.55
"Trackless trolley-car"	20.95

"The department believes, therefore, that in installing these "trackless trolley" systems on Staten Island, the city is inaugurating a method of transportation that will make possible the rapid and economical development of the outlying portions of the city and that will be found of immense practical value in enabling the city to clear its streets of the rails that now encumber them."

Sees Hope in Conference

"Only a casual survey of the European situation is needed to show that American motor vehicles of all types are required. Trucks certainly are necessary for their basic industries," says Alvan Macauley, president of the Packard Motor Car Company. "But aside from the export angle," he continues, "and more important to all Americans, is the domestic benefit that would come out of a successful conclusion to the conference. Naturally, all industries of the United States would profit to some extent, the degree varying in accordance with the importance of the industry and prospects in foreign trade. Immediately we could expect a reduction in taxes, and such a move would impart confidence to everyone. The domestic motor business of course would benefit as increased industrial activities swelled the demand for the efficient, economical transportation provided by the motor truck. These vehicles are constructive 'armaments' for industry and are productive utilities. All other things being equal, the nation that led the world in number of motor vehicles would be the most successful in the development of her resources, for transportation is the first essential of progress."

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More Railroads Likely to Follow Plan of Erie Line

MUST ACCEPT TRUCKS AS THEIR ALLIES

The Erie Railroad plan of transporting freight between New Jersey and New York by motor truck will spread into general use at the large terminals of the country, in the opinion of A. J. Brosseau, secretary and director of the National Automobile Chamber of Commerce, speaking at the Shippers' Conference of Greater New York, January 10. Eight railroads leading into Cincinnati, Mr. Brosseau pointed out, have been using a joint motor truck system for the local transshipment of goods, cutting the cost of handling nearly one-half. Los Angeles, Buffalo, St. Paul, Rochester, and other cities have also made a start in the use of motor truck terminals.

The serviceability and economy of motor trucks in short-haul work of 40- to 50-mile radius is recognized by many leading railroad authorities. The trucks can relieve the rail lines of the expensive handling of less-than-carload lots. The New York Central railroad is using a 9-compartment express car, each having a container with a capacity of 6,000 pounds that can be carried by motor truck direct to the consignee.

Mr. Brosseau quoted several railroad leaders indicating the trend of the attitude of the rail lines toward motor truck usefulness. Elisha Lee, vice-president of the Pennsylvania System, has said, "To the extent which motor vehicles are likely to take over the short-haul freight traffic the railroads will probably be immediately benefited financially." Gerrit Fort, vice-president of the Boston & Maine Railroad, has also indicated the value and place of the truck by saying, "The motor truck has come to stay. It represents an economic change in transportation conditions which is little short of revolutionary. There is no use in fighting the motor truck. Within their own field the trucks are unbeatable."

"The motor truck has become an ally," said Mr. Brosseau, "rather than a competitor of the railroads, making possible the permanent and intensive development of the long haul, which is the logical and profitable field of railroad operation."

Duplex Surplus $110,387

Current assets of the Duplex Truck Company, Lansing, Michigan, are reported on the company's balance sheet for the year ended October 31, as amounting to $910,522. Of these assets inventories make up $635,876, capital assets. $626,784, and deferred charges $7,428. Current liabilities total $419,636, which are divided as follows: accounts payable $8,085, notes payable $409,712, accrued pay-rolls $1,562, excise taxes $276. Reserves total $14,711, and there is a surplus of $110,387. Total assets and liabilities are listed at $1,544,735. Belief that the motor truck industry has passed the lowest water mark and that recovery will be slow but sure is expressed by President H. M. Lee. "All conditions have operated against the selling of trucks on a profitable basis," he states. "However, I feel convinced that by a year from now those truck manufacturers who are conducting their business along safe and sensible lines and who are producing at a fair price will be so situated that a profitable and successful future will be assured."

¾-Ton Service Speed Truck

The new Service speed truck, Model 12, is now in production. It is a ¾-ton chassis with 128-inch wheel-base, built along practically the same lines as the 1-ton speed truck, model 15. The price is $1,240.

The specifications are as follows:

Engine.—Midwest, heavy-duty truck type, 3½-inch bore and 4½-inch stroke. Force-feed lubrication; oil pumped under pressure by self-priming geared pump, automatically controlled plunger regulating oil flow in relation to actual load on engine, and not dependent on the speed of the engine. Removable cylinder heads permit machining of entire combustion chamber and providing for cleaner coring of water passages. Actual horse-power, 32 at 2,000 r.p.m.

Carbureter.—Plain-tube type with hot-air stove and choker located in instrument board. Hot-spot manifold.

Ignition. — Battery, Remy distributer. Spark control by hand lever underneath steering wheel.

Cooling.—Continuous tube-and-fin type core, pressed-steel shell, mounted on leather pads to absorb shock and vibration. Air drawn through radiator by 16-inch fan driven by 1¼-inch belt. Thermo-siphon system of circulation.

Clutch.—Single dry plate clutch, 10-inch.

Transmission.—Selective type, 3 speeds forward and reverse. Mounted in unit with clutch and engine.

Propeller-Shaft.—2½-inch tubular shaft with metal universal and slip joint at front and where it connects to transmission, and flexible fabric joint at rear end connecting to axle.

Front Axle.—Designed to accommodate transverse front spring construction. Drop-forged I-beam section of alloy steel, heat-treated. Axle center 2½ inches deep by 1⅝ inches wide by ⅜ inch web. Front spindles 1½ inches in diameter fitted with taper roller-bearings.

Rear Axle.—Timken spiral bevel, pressed-steel housing, taper roller-bearings, nickel-steel differential and gears, chrome-vanadium steel shafts.

Brakes.—Internal-expanding cam-actuated, brake drums 15 inches in diameter, width of brake shoes 2½ inches. Service brakes operated by foot pedal, emergency brakes by hand lever.

Control.—Left-hand drive, center control. Gear-shift and emergency brake levers mounted on transmission. Spark and throttle control by hand levers under steering wheel. Throttle control also by foot accelerator.

Steering Gear.—Ross worm-and-nut type 18-inch steering wheel.

Frame.—Pressed-steel channel section 5⅞ inches deep by 3-inch flange width by ⅛-inch stock. Length back of seat to end of frame, 95 inches; width, 30¾ inches front and 37 inches rear; chassis 29 inches high.

Springs.—Semi-elliptic front and rear. Single front spring pivoted to frame at center, providing 3-point suspension of frame; 38 inches long by 2½ inches wide, with 9 leaves of total thickness of 2 21/32 inches; eyes bronze-bushed with 1¼-inch shackle-bolts. Rear springs 50 inches long by 2½ inches wide by 4 5/64 inches total thickness, with 9 load-carrying leaves and 3 rebound leaves; eyes bronze-bushed for 1¼-inch shackle-bolts.

Chassis Lubrication.—Automatic splash feed to shackle-bolts. Self-lubricating bushing for brake-shafts, etc.

Wheels.—Wood artillery type.

Tires.—Pneumatic cords, 32 by 4½-inch front and rear.

Gasolene Tank.—In cowl, 12-gallon capacity.

Wheel-Base.—128-inch, track 56½ inches.

Speed.—25 to 40 miles per hour.

Chassis Weight.—2,720 pounds.

Equipment.—Remy electric starting and lighting equipment, Exide battery, electric head lamps, cowl light, tail-lamp, electric horn, jack, tire pump, tools, oil-can, spring bumper, front fenders, step, instrument board, gasolene tank, toe and floor boards, speedometer, extra rim, seat cushion, tire repair kit.

Truck Proves Valuable in "Pulling" Sluggish Wells

USED FOR OTHER PURPOSES ALSO

Oil-producing companies in most of our oil fields to-day are deriving their biggest revenue, not from sensational "gushers" of the stock-promoting type, but from the steady, forced flow of numerous small producing wells. Various pumping methods for getting the oil out of these wells are in use, yet, because of the nature of the soil and the great depth in which pumps must work, they frequently become clogged with sand, making it necessary to remove all pumping equipment and then thoroughly clean the well. This difficult task of cleaning or "pulling" sluggish oil wells is being economically accomplished in many fields by a portable well-pulling outfit.

The equipment consists of a 3½-ton truck on which is mounted a hoisting drum, which receives its power from the truck motor. The truck is driven to the well, a cable is run from the hoist over the top of the derrick and attached to the well rods and tubing. These are quickly drawn out by the hoist, which has a lifting power of 5 tons and a cable capacity of 4,000 feet and which pulls at the rate of 180 to 200 feet a minute. Next a bailer is attached to a second cable and the sand that has accumulated on the inside of the well casing is removed. After the well has been "pulled" in this way, the same apparatus is used for replacing the sucker rods and tubing.

This portable well-tubing outfit has several distinct advantages over the stationary engine and hoist type of equipment used for the same purpose. As it has practically an unlimited operating radius, it can pull several wells in a day even though they are miles apart. In addition to its well-pulling capacity the truck can be used for general transportation work as the hoist is removable. At the same time oil operators are finding that the hoist can be utilized in many ways, such as for moving houses, removing old pipe lines, and dismantling old rigs. Its versatility is further indicated by the following letter received from D. T. Saine, Superintendent of the Petroleum Development Company of Bakersfield, California.

"We consider the service of the hoist excellent in every way, not alone for pulling wells and bailing, but for doing various heavy jobs around the lease. With a tackle pulling direct from the draw works, we are able to move heavy rig material and machinery with perfect ease from positions that are not accessible to either trucks or teams. In one instance a heavy mud pump was drawn up on the truck on skids, transported to the new location, drawn off and set in position, with the greatest ease and a big saving in labor and time."

The manufacture of steel truck bodies in Johannesburg, South Africa, will soon be begun, as machinery is now being imported for that purpose.

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For Improved Motor Transport

In a lecture on the scope and limitations of motor transport, at Liverpool University recently, E. S. Shrapnell-Smith, chairman of the Commercial Motor Users' Association, pointed out that scope is automatically tested out, once the glamor of the novelty is removed, by the governing considerations of cost and performance. Net earning capacity is the key to scope, which may enlarge or shrink according to various current factors.

In town haulage the scope of motor transport, by reason of high incidence of waiting time, is partly dependent upon the inclusive working cost per hour of horse units of equal load capacity. He placed the inclusive working cost of a 6-ton gasolene or steam wagon approximately at $2.52 (normal exchange) per hour, and that of a 2-ton horse truck at $1.56 an hour. These figures are roughly current for Liverpool or any other big city, except London, where they may call for a 15 or 20 per cent. increase. Electric truck costs fall midway between.

Terminal delays are among the most serious of adverse factors. Efforts to overcome these disadvantages should include the provision of additional and appropriate loading or unloading platforms, booked times (failure to adhere to which involves taking the last position among waiting unbooked vehicles), and, in the case of certain traffic, depot-to-depot working with transhipment on "flats," or other removable bodies or containers, to local vehicles for completion of delivery or distribution. Every hour saved represents not less than 8 miles of running on outer urban or country roads.

There are two possible directions of improvement open to transport interests of Liverpool. One is to provide the additional platforms at which motors shall have priority over horse vehicles, but to which the latter can have impeded access if no motor is in occupation; the other is to build new blocks of warehouses at a radius of 3, 4 or 5 miles from the docks, where land is cheaper than in the congested warehouse streets. To and from these motors indifferent to the intervening gradients could now be worked at virtually the same cost per ton moved as they are for a one-mile haul nearer the river.

An interesting relationship emerges from census data of motor traffic, and in such figures he suggested an extra column for the estimated yield of direct motor taxation per mile of highway. The basis of calculation on annual average tax and mileage was:

	Average direct taxation per mile run per vehicle
For each motor 'bus, motor cab, or motor truck	$ 1.32
For each motor car	.90
For each motor-cycle	.14

The success of motor traffic has apparently replaced, or at least suspended, light railway development, said Mr. Shrapnell-Smith, except for states where no highways exist.

He refrained from entering upon the controversy of electric street-car *versus* motor omnibus, but, personally, he held the view that the former had passed its zenith. The successful adoption of motor 'buses, each carrying 56 passengers seated, has already permitted a performance capacity of 15,000 seated passengers in one direction per hour past a given point where other traffic intermingled, allowing for 50-seated omnibuses a space of 200 feet for each vehicle, assuming a speed of 12 miles per hour.

Benzol as Motor Fuel

After some observations on the importance of using only a standard quality of benzol for combustion engine fuel, Captain E. de Normanville, in an address before the recent Transport Congress in England, summarized the advantage of this fuel as comprising the following six points: More power, increased mileage, voidance of "pinking", economy in use, "sweeter" running, and home produced. Against these qualities he quoted three disadvantages: Benzol freezes at a higher temperature than gasolene, has a lower volatility, and is a stronger solvent than gasolene.

Of these drawbacks the last is accounted the most important, but he pointed out that damage on this score is avoidable by care in pouring so as to prevent splashing of the benzol over painted parts.

The more the benzol content, the better the fuel. It has about 20 per cent. more thermal energy per gallon than gasolene. Theoretically, while there is a 20 per cent. improvement in mileage or power with benzol, practically the larger mileage is obtained and concurrently, too, more power, assuring always accurate combustion and ignition. As to "pinking" or "knocking" from pre-ignition, with a 50 per cent. admixture of benzol to gasolene it is unnecessary to retard the spark. The rate of the flame's propagation and the combustion rate with benzol are slightly slower, and the benzol explosion has more affinity to the steam-engine's jet. Therefor, with benzol a more even torque is obtained, and, in the author's further opinion, it is quieter than with gasolene.

At present retail prices benzol averages 20 per cent. higher cost than gasolene, but the discrepancy is removed on reference to the better mileage from benzol, so that the net result from the two fuels is almost equal.

It follows that if benzol is less susceptible to "pinking," the resultant injury to the chassis and engine is correspondingly reduced, and the same remark holds good concerning the propensity to carbonization within the cylinder.

"To obtain the best results from the use of benzol or benzol mixtures you must use a suitable lubricant," says the author. "At the least you must use a high-grade *mineral* base oil, as animal or vegetable compound oils are not suitable unless one is prepared to change to a fresh supply more frequently. The reason is that, by some action not yet fully known, benzol vapors tend to accelerate sedimentation. As a matter of fact all lubricating oils undergo a chemical and physical change when exposed to high temperatures, resulting in sedimentation. The rate of the formation of sediment, however, differs greatly between oils of good and of poor quality when used under similar conditions. . . ."

Motor Service in China

The North Long-distance Automobile Service Company has been organized by Chinkiang merchants to carry passengers from Susien to Hsuchow Kiangsu, in China. The fare for each passenger will be $6.

Kiangsu merchants are organizing a company to be known as the Suchow-Kashing-Huchow Motor Service Company, Ltd., with a capital of $3,000,000. Five routes have been planned: (1) Soochow (Kiangsu) to Huchow (Chekiang) via Wukiang, Pingwang and Nansing, a distance of 181 miles. Pingwang (Kiangsu) to Kashing (Chekiang) via Shengtseh, a distance of 36 miles; (2) Soochow (Kiangsu) to Fushan (Kiangsu) via Changshu, a distance of 166 miles; (3) Soochow (Kiangsu) to Taitsang (Kiangsu) via Kunshan, a distance of 166 miles; (3) Soochow (Kiangsu) to Taitsang (Kiangsu) via Kunshan, a distance of 100 miles; (4) Kashing (Chekiang) to Chapu (Chekiang) via Pinghu, a distance of 80 miles; (5) Huchow (Chekiang) to Kwangteh (Chekiang) via Changhing and Szean, a distance of 172 miles.

Snow Removal in Norway

The motor snow-plow experiments have been successful to such an extent in northern Norway that it is expected that several municipalities will adopt this method next year. As the roads are the only means of communication for most of the country, and as they are often too narrow for two sleighs to pass, it is necessary that they be kept open. The first difficulty was to obtain powerful enough automobiles or tractors. The ordinary truck and even agricultural tractors have not sufficient power to draw the plows when the snow is heavy, and it seems to be the opinion that a 4-wheel-drive is essential.

In many cities the streets also are kept well cleared by snow-plows. Various American and continental agricultural tractors have been used for this purpose. Except for the first cost, these tractors seem more economical than horses for this work. If tractors could be utilized during the summer for street-cleaning or sprinkling their superiority would be unquestioned. Trucks would be preferred to tractors, if they could perform this work, because of their utility for other purposes.

Motor 'Bus Services in Spain

There is a possibility of valuable concessions for 'bus lines being granted in Spain in the near future. France has apparently obtained the rights for running 'buses in Madrid, in spite of British competition. Similar services are reported to be contemplated in Barcelona and other cities. No American motors are being utilized.

The Nuckolls County Highway Commissioner, in writing to the Nebraska State Equipment Division concerning a truck received, said, "The truck rolled right along and the man never had a bit of trouble, did a bit of dragging the next day in 3 hours' time that ordinarily required 8 hours with our tractor. I think we will have use for another one some of these days."

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Must Roads Fit the Traffic?

By H. S. FAIRBANK

Senior Highway Engineer, United States Bureau of Public Roads

THE researches in which the greatest progress has been made in road-building have dealt principally with the physical problems involved in the design of the roads themselves, and certainly our ignorance of the physical properties of subgrade and pavements is sufficient to justify immediate study. But even more important than some of the physical problems are those of an economic nature which condition the character of the physical construction. Before any highway at all can be built these problems must be faced, and by far the majority of considerations influencing the location and type of the road are economic and not physical considerations.

Thus, one of the first things that must be known before any highway can be intelligently designed is the character of the traffic it will carry. In this respect the railroad engineer has a relatively simple problem. The traffic he prepares for is more or less definitely predictable. But for the highway engineer the future is cloaked in uncertainty. This much he can be reasonably sure of—that the traffic of the past is no sure index of the traffic of the future. The past use of the road has been governed by its physical condition. When its physical condition is altered the traffic which uses it will change. In a qualitative way it is clear that the future use of the road will depend upon its condition relative to that of other roads serving the same territory. It will also depend upon the character of the towns or cities connected by the road, the distances between them, the nature of the urban and rural industries and the relation of the road's location with respect to steam and electric railroads and navigable waterways. It is not difficult thus to single out the governing factors; the difficulty lies in placing quantitative limits upon each of them.

For purposes of design the engineer must know both the approximate volume of the future traffic and the weight of the heaviest vehicle. Knowledge of the volume of traffic is needed principally to determine the width of the road, the attrition of the surface, a function of volume, being practically negligible when the large majority of vehicles are rubber-tired. The maximum vehicular weight is required to determine the strength of the road surface. In this determination volume plays an unimportant part. It is possible that the repetition of maximum loads may serve to fatigue the road structure and cause it to break down under a load which it would carry safely if applied only occasionally. But, broadly speaking, the road must be designed to carry the heaviest load that will be applied to it, whether that load is applied few or many times.

If this were all the information required, therefore, the economic problem would not be difficult. We could assume with practical certainty that every road—no matter what its location—would occasionally have to carry the heaviest vehicle manufactured, and since the policy of vehicle manufacturers is to restrict weight to a standard maximum, this would not be difficult to determine. As volume of traffic (assuming that it is rubber-tired) has practically no effect upon the design of the surface except as it concerns width, the conclusion would necessarily be that all roads must be constructed of equal strength and that the only permissible variation is in their width.

Such a conclusion, while entirely consistent with the physical requirements of unregulated traffic, fails to take account of all the economic facts. Large, heavy vehicles are used in preference to small, light vehicles because their relative cost of operation is lower. One hundred tons transported in 5-ton vehicles will be moved at a lower cost than if it is carried in 1-ton vehicles; but to operate the heavier vehicles requires a heavier and more expensive road. The economic problem, therefore, is to balance the greater cost of the stronger road against the lower operating cost of the heavier vehicle.

To determine how much more can be economically expended to build a road for a traffic of 5-ton instead of 2-ton vehicles the saving in cost of operation per ton-mile must be multiplied by the number of ton-miles carried during the year, and the result will be an annual saving in operation which, capitalized, is the amount that can be spent to strengthen the road to carry 5-ton instead of 2-ton vehicles.

It must be evident, therefore, that if only a few of the heavier vehicles use a given road the saving in operating cost by their use cannot be sufficient to justify the additional expense of the stronger road, while if the traffic of such vehicles is large the saving may more than offset the greater construction cost. It appears, therefore, that the facts with regard to traffic, that must be known before any intelligent decision as to the type and dimensions of the road can be reached, are as follows:

(1) The maximum weight of vehicle.

(2) The volume of traffic.

(3) The relative proportion of heavy and light loads in the traffic.

It is this last named fact that is difficult to determine in advance of construction. In its unimproved condition it is likely that the road has been used by but few heavy vehicles, simply and solely because of its condition. When the condition is improved the chances are that the number of large vehicles that will be operated over it will be increased. How great will be this increase and what expenditure for road improvement will be justified by it is the road-builder's problem; and it is a problem that needs a great deal of general and special study.

Unfortunately the uncertainty goes deeper than the mere question of first cost. Supposing that it be decided upon purely financial considerations to build 30 miles of a given road outward from a city, as a 5-ton road. For that distance, let us say, it is anticipated that the road will carry a sufficient number of 5-ton vehicles to justify the construction of the 5-ton surface. Beyond the 30-mile point such a showing can not be made and it is decided to provide for vehicles no heavier than 3 tons. What then is to be done about the occasional 5-ton vehicle which it is desired to operate to the town or village 60 miles from the city? Is its operation beyond the 30-mile point to be prevented? If so, how is it to be prevented? By police regulation? Then we must take into our financial computations the cost of policing the junctions of heavy and light traffic roads, else assuredly the occasional heavy truck will continue on the light traffic road in defiance of law.

Nor have we reached the bottom of the matter yet, for the strict enforcement of such a regulation will mean one of two things, either of which will add to the transportation costs. Either the cargo of the heavy truck must be transferred to a lighter vehicle at the junction of the light traffic road, or matter destined for points beyond the junction will have to be shipped all the way in light trucks.

All this involves loss in operating cost. To build all roads for the heaviest units, which is practically the alternative, means waste in road construction, in that the cost of strengthening a large part of the system will never be repaid by the saving in operating expense resulting from the use of the few heavy vehicles that will ply over that part. Which way does economy lie?

The question will never be definitely answered except in connection with the special conditions surrounding each case, but there are a number of general questions, which will arise in every case, which deserve immediate attention by those who are working to solve the newly recognized highway problems. Such matters as the operating cost of motor vehicles; the economic motor-truck haul in competition with steam and electric and waterway transportation, and in the absence of such competition the highway traffic contributions of the principal industries; the relation of cities and the distance between them to the character of highway traffic—these are matters requiring general study for application to particular cases. In view of their manifest importance it is difficult to understand why they have not already received the careful, scientific study that is being given to the solution of the more important physical problems.

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Coming Events

February 3 to 10.—Minneapolis. Fifteenth Annual Automobile Show, auspices of Minneapolis Auto Trade Association. Trucks, Cars and Accessories. W. R. Wilmot, 709 Andrus Bldg.

February 6 to 9.—Scranton, Pa. Annual Truck Show, auspices Scranton Motor Trades Association, Armory. Hugh B. Andrews, Mgr., 411 Board of Trade Bldg.

February 11 to 18.—Allentown, Pa. Annual Truck Show, Lehigh Valley Auto Trade Association. P. W. Brooks, Sec., 1014 Hamilton St.

February 11 to 18.—San Francisco. Sixth Pacific Automobile Show, auspices Motor Car Dealers' Association of San Francisco, Exposition Auditorium. Trucks, Cars, Tractors and Accessories. G. A. Wahlgreen, Mgr., 215 Humbolt Bank Bldg.

February 11 to 18.—Atlanta, Ga. Second Annual Great Southern Automobile Show, auspices Atlanta Automobile Association, Auditorium Armory. Trucks, Cars and Accessories. Virgil W. Shepard, Mgr., 305 Connolly Bldg.

February 11 to 18.—Kansas City, Mo. Annual Automobile Show of the Kansas City Motor Car Dealers' Association, at the Overland Bldg. E. E. Peake, Sec., 1019 Gloyd Bldg.

February 18 to 25.—Albany, N. Y. Thirteenth Annual Show, auspices Albany Automobile Dealers' Association, at State Armory. Trucks, Cars and Accessories. J. B. Wood, Sec., 28 Howard St.

February 18 to 28.—San Bernardino, Calif. Automobile exhibit at the 12th Annual Orange Show, in tents. Trucks, Cars, Tractors and Accessories. Royal H. Mack, Mgr., Chamber of Commerce.

February 20 to 25.—Duluth. Seventh Annual Show of Duluth Auto Trade Association, Duluth Armory Bldg. Trucks, Cars, Tractors and Accessories.

February 20 to 25.—Deadwood, S. Dak. Tenth Annual Black Hills Auto Show of the Deadwood Business Club, Auditorium. Trucks, Cars, Tractors and Accessories.

February 27 to March 2.—Bethlehem, Pa. Seventh Annual Truck Show of Bethlehem Auto Trade Association, Coliseum. Trucks, Tractors and Accessories. J. L. Elliott, Mgr., 1308 Norway Pl.

February 27 to March 4.—Portland, Me. Automobile Show, auspices Portland Automobile Dealers' Association, Portland Exposition Bldg. Trucks, Cars, Tractors and Accessories. Howard B. Chandler, Mgr., 3 Park Ave.

February 28 to March 4.—Wichita, Kan. Third Annual Show of the Wichita Motor Trade Association, Wichita Exposition Bldg. Trucks, Cars and Accessories. Guy H. Johnson, Sec., P. O. Box 372.

March 6 to 11.—Indianapolis. Twenty-fourth Semi-annual Show of the Indianapolis Auto Trade Association, Auto Show Bldg. Trucks, Cars and Accessories. John B. Orman, Mgr., 338 N. Delaware St.

March 6 to 11.—Nashville. Automobile Show of the Nashville Automobile Trade Association, Hippodrome or Page Garage. Trucks, Cars and Accessories. Allen F. Parkes, chairman, Packard Nashville Motor Company.

March 6 to 11.—St. Joseph, Mo. Eighth Annual Show of St. Joseph Automobile Show Association, Auditorium. Trucks, Cars, Tractors and Accessories. R. S. Trachsel, Sec., 305 S. 8th St.

March 11 to 18.—Newark, N. J. Fourteenth Annual Show at the First Regiment Armory. Trucks, Cars, Tractors and Accessories. Clyde E. Holgate, Mgr., 343 High St.

March 11 to 18.—Boston. Twentieth Annual Automobile Show of the Boston Automobile Dealers' Association and Boston Commercial Motor Vehicle Association, Inc., Mechanics Bldg. Trucks, Cars, Tractors and Accessories. Chester I. Campbell, Mgr., 5 Park Sq.

March 11 to 18.—Bronx, N. Y. Bronx County Automobile Show, at 105th Field Artillery Armory, 166 Street and Franklin Avenue. Trucks, Cars and Accessories. H. G. Stiles, Mgr., 2483 Tiebout Ave., Bronx.

March 13 to 18.—Omaha. Seventeenth Annual Show of Amaha Auto Trade Association, Omaha Auditorium. Trucks, Cars and Accessories. A. B. Waugh, Mgr., 2051 Farnam St.

March 22 to 26.—Ann Arbor, Mich. Third Annual Show of Washtenaw County Auto Dealers' Association, Coliseum. Trucks, Cars and Accessories. R. H. Alber, Mgr., care of Ann Arbor Garage.

March 27 to April 1.—Oklahoma City. Sixth Annual Show of the Oklahoma City Motor Car Dealers' Association, at New Coliseum. Trucks, Cars and Accessories. Edgar T. Bell, Sec., 403 Oklahoman Bldg.

Continental Motors' Condition

The Continental Motors Corporation, Detroit, for the year ended October 31, 1921, shows a loss of $371,534 from operations after interest and depreciation, which compares with a net profit of $3,567,504 after all charges and federal taxes in 1920. Dividends of $294,168 and an inventory loss of $904,292 increased the total deficit for the year to $1,569,994, whereas the final surplus for the fiscal year ended October 31, 1920, was $2,517,611. The company shipped one-third as many engines during the 1921 fiscal year as during the previous fiscal year. With inventories written down and a good volume of orders now on hand, the company is in a position to turn a successful year during 1922.

The balance sheet as of October 31, 1921 lists total assets and liabilities of $30,797,725 as against $26,457,502 the previous year. For the purposes of comparison the two balance sheets are given here:

ASSETS.

	1921.	1920.
Plant and equipment	$20,122,346	$13,333,817
Investments	102,133	89,469
Cash	1,205,133	542,055
Notes receivable	3,065	54,735
Bills and accounts receivable	719,473	1,007,589
Inventories	8,414,522	11,164,999
Prepaid items	122,557	115,655
Gold notes discounted	108,496	149,183
Total	$30,797,725	$26,457,502

LIABILITIES.

Preferred stock	$ 2,100,700	$ 2,151,700
Common stock	14,607,250	7,295,370
Gold notes	5,000,000	5,000,000
Notes payable	3,275,247	2,590,073
Purchase money obligations	19,900	37,950
Accounts payable	512,653	1,535,545
Accrued interest, taxes, etc.	233,739	1,327,223
Contingencies reserve	269,171	174,332
Surplus	4,779,065	6,345,309
Total	$30,797,725	$26,457,502

President R. W. Judson, in his remarks, says in part: "A reduction of $2,750,000 in inventory reflects the results of strenuous efforts. This, however, will be reduced more rapidly now that the demand for truck motors is increasing, as the larger part of the inventory consists of truck motor material. All commitments in respect of forward deliveries have been adjusted. In reducing inventory values to market at October 31, 1921, a writedown of $904,292.26 was taken. While the company had firm sales orders on hand sufficient to cover the inventory at cost, nevertheless the urgent needs of our customers in an era of unprecedented competition called for sincere and effective coöperation, on our part, evidenced, as a result, by substantial price reductions.

"The business depression naturally had its effect upon the sale of motors, although the company received its full share of the available motor business, and actually shipped one-third as many motors as during the previous fiscal year. After the readjustments made during the year, the value of sales orders on our books on October 31, 1921, was $38,568,686 or 28 per cent. less than at the close of the previous year. Contracts during the past two months, however, bring the total to over $50,000,000. These contracts are with the most active and successful passenger-car and truck manufacturers in the industry."

Big Future for 'Buses

"The motor industry has been the greatest industrial development of the past decade, and is about to furnish to the world another subject for wonder and envy," says Walter E. Parker, President of the Commerce Motor Car Company. "The fast growing use of motor 'bus transportation gives promise of phenomenal development during the next few years, and will have a marked influence on the life of the nation. It carries with it great possibilities of profit to the small investor as well as for the great capitalist. The near future will see laid the foundation of fortunes that will compare with those which followed the development of the interurban traction lines during the past twenty years.

"'Bus transportation, however, has this added attraction: To build and equip an electric line required so much capital investment, measured in not less than millions, that only those who commanded millions were able to engage in the business. Motor 'bus transportation is open to the man with limited capital as well as to the man with millions. From records of those operators now operating 'bus lines, we find the cost of operation to be less than 1 cent per passenger-mile, including all overhead, operating insurance and sinking-fund charges. We have before us the records of a motor 'bus company, with an investment of $30,000, operating 4 motor 'buses on a certain route, that is earning 70 per cent. for its stockholders, in addition to providing a sinking-fund sufficient to care for all necessary repairs and replacements and to retire the entire investment in equipment within four years. The company is doing this in a territory already served by electric railroads.

"A motor 'bus seating 20 passengers requires an initial investment of from $4,000 to $5,000 dollars, and costs, including all charges specified above, just under 18 cents per mile to operate. There are many districts in this country, where a round-trip route can be easily found where the distance traveled on the trip will not exceed 50 miles, and where a 'bus can easily make 3 round trips per day, at a cost of $27.00; and carrying only 60 per cent. capacity, at a charge of 2½ cents per passenger-mile, the daily income will be $45.00, showing a profit of $18.00 per day.

"With these possibilities capital will be attracted to the business and the stocks of motor 'bus companies will become fashionable with investors all over the country. New companies, both small and large, are being formed to take care of the large demand for 'bus service. Motor truck factories will be busy supplying the demand for motor 'buses, as the United States is full of farseeing men who are quick to grasp an opportunity and who will wish to be among those who are the first to ride into fortune on a motor 'bus."

Passenger-and-Freight Truck

A convertible truck, which can also be used as a regular passenger vehicle, has been suggested for use in the farming districts of South Africa. A demonstration truck of this kind is being brought out by the representative of a large American truck company.

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Exports Show Big Increase Over Last Pre-War Year's

TRUCK SHIPMENTS GREW 594 PER CENT

Automotive exports during the calendar year 1921 (December figures estimated on the basis of returns for the preceding five months) reflect the progress made since the pre-war year 1913:

Items.	1913 Number.	1913 Value.	1913 Unit Value.	Per Cent of Increase(+) or Decrease(—) in Unit Value.	1921 Unit Value.	1921 Number.	1921 Value.
Motor trucks	1,000	$ 1,686,807	$1,672	—12	$1,472	7,000	$10,302,000
Passenger-cars	25,880	25,343,644	979	+ 6	1,037	31,000	32,140,000
Parts	....	6,270,116	....	....	....	....	38,687,000
Engines	8,815	1,630,121	185	+11	205	8,000	1,638,000

The greatest increase over 1913, the last pre-war year, is shown in shipments of motor trucks—594 per cent. increase in number and 511 per cent. in total value. Passenger-car exports increased by only 20 per cent. as regards number and 27 per cent. as regards total value, while shipments of parts increased 517 per cent. as regards value. Engines decreased 9 per cent. as regards number and increased 0.4 per cent. as regards total value.

That the relatively higher prices of 1921 have not prevented a generous increase over 1913 exports is borne out by these figures, which show an increase of 58 per cent. in the total number of passenger-cars, trucks, and motor-cycles exported in 1921. The nearly equal unit values of 1913 and 1921 for almost all classes of motor vehicles, in spite of the higher prices in 1921, is probably accounted for by the shipment of larger numbers of lighter-grade vehicles that were selling in 1921 for the same price as the vehicle of much higher class sold for in 1913.

Whatever the relation of price increases and increased exportation of lighter-grade cars, the fact remains that exports of automotive products, especially as regards motor trucks and parts, made a very much better showing in the 1921 year of general business depression than in the pre-war year of 1913; and the automotive manufacturer can, in spite of temporary slackness, look back upon a satisfactory development of his export business.

Bennett With Lease Motors

S. E. Bennett, for many years identified with the motor truck industry and until recently with the Rainier Motor Corporation, has been made director of sales for the Lease Motors Company of New York City, with offices at 343 Madison Avenue. The Lease concern, which has been making trucks for export only, is erecting a factory at Long Island City for the manufacture of a 1½-ton worm-drive truck, which will be sold to the domestic trade at a low price.

Parts and Accessory Trade

Purchases of supplies from members of the Motor & Accessory Manufacturers' Association by automotive manufacturers in 1921 aggregated $238,062,591. The total of past-due accounts held by members of the M. A. M. A. declined from $8,099,727 in January to $4,220,450 in December. The total of notes outstanding fell from $4,359,871 in January to $3,384,250 at the end of December.

December showed a falling off in sales as compared with November, although the decline was not as great as had been expected. Sales in November were $18,998,490 and in December $14,349,750, a falling off of 24.47 per cent. Business in October aggregated $22,053,327. It was significant of the improved conditions in the automotive industry that December business was very much better than sales in January and February. In fact, it did not fall far short of equalling that done in the first two months of the year together. The statistics by months for the entire year follow:

Month.	Purchases.	Per Cent. Change.	Past-Due Accounts.	Per Cent. Change.	Notes Outstanding.	Per Cent. Change.
January	$ 6,264,587	.....	$8,099,727	.....	$4,359,871	.....
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,063,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	00.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.

Federal-Aid Projects Completed

A summary of the kinds of roads provided by means of federal aid since 1916 shows gravel construction at the top of the list in point of mileage and concrete first in point of cost. The figures given below show the results of five years' work to November 1, 1921:

Type of Road.	Total Cost.	Percentage of Total Cost.	Mileage.	Percentage of Total Mileage.
Brick	$ 22,039,844.58	4.4	444.6	1.6
Concrete	184,021,244.65	37.1	4,653.6	16.5
Concrete, bituminous	23,445,374.88	4.7	772.5	2.7
Gravel	104,614,066.71	21.2	10,043.5	35.7
Macadam, bituminous	41,412,557.22	8.3	1,323.2	4.7
Macadam, waterbound	22,452,778.82	4.5	1,290.7	4.6
Sand-clay	22,226,302.66	4.5	2,695.5	9.6
Bridges	20,235,200.13	4.1	47.4	0.2
Grading	55,704,253.78	11.2	6,864.0	24.4
Totals	$496,151,683.43		28,135.0	

Considering only pavements, the three types represented above—brick, concrete and bituminous concrete—required a total expenditure of $229,506,464.11, of which 80.2 per cent. was spent for concrete roads. The mileage of the pavements is 5,870.7, of which 79.3 per cent. is concrete.

21,305 Trucks in Wisconsin

Passenger-car registrations in Wisconsin in 1921 showed a net gain of 43,662 over those in 1920, while motor trucks gained 5,100 and there was a loss of 1,567 in motorcycles. There were 176 more dealers licensed in 1921 than in the previous year. At the close of business, the secretary of state at Madison showed a total registration of 320,755 passenger cars; 21,305 trucks; 6,435 motorcycles and 2,122 dealers. All Wisconsin licenses are annual and expire December 31 each year, regardless of the time of year issued.

Makers Seek Economies Through Export Combine

WOULD INCREASE CREDIT FACILITIES

An export combine involving 130 companies which do a domestic business of over $1,000,000,000 annually was considered by the motor vehicle makers at the Export Managers' Convention of the National Automobile Chamber of Commerce held in New York January 10. The combine, as proposed by G. F. Bauer, secretary of the N. A. C. C. Foreign Trade Committee, would enlarge credit resources and lower the overhead cost of foreign trade in trucks and cars in the following ways:

The credit of the export combine would be greater than that of any single company or group. It could investigate the financial rating of foreign buyers at small cost to each individual company. Its resources would permit extending credit to foreign markets on a basis competitive with foreign countries.

Combination would mean much lowered cost per company in documentation, stenographic and translation work, packing offices, ocean insurance, financing and research work. Parts and repair stations could be established abroad on a scale which would be virtually impossible under individual competition.

It is proposed to reduce the cost of the normal competitive function of selling by grouping the participating members in non-competitive classes. That is, each group could contain several automobile companies operating in different price classes which could have one central selling agency, just as in this country a dealer often handles several different makes in different price groups.

French Foreign Truck Business

In the first six months of this year the truck exports of France fell off sharply, the decrease being 23 per cent. in value, as compared with the same period of 1920. Imports of trucks fell 99 per cent. this year.

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Milburn Trucks Ready

The new models of motor trucks, manufactured by the Milburn Wagon Company of Toledo, Ohio, are now in production. They include the model 43 of ½-ton rating and the model 40 of 1-ton capacity, the former priced at $1,585.00 for the chassis without battery and the latter at $1,985.00 f.o.b. factory. All parts of these two trucks are standardized and to a large extent are made interchangeable.

Frames in both units are of pressed-steel. Cross-members are placed alike, the front member in each case being designed and constructed as a bumper.

The entire assembly forward of the pay-load space, including the unit power plant, battery installation, hood, lamps, steering apparatus, control lever, foot pedal, reverse foot button, cowl and instrument board, is identical in both models.

The unit power plant is an *en bloc* assembly and includes a motor of large capacity, controller, resistance and hand brake, and is hung by brackets forward and aft attached to frame cross-members, and standardized as to bolting, bracket lengths, etc.

The final drive of each model is of worm construction and is assembled direct to the motor by universal joints of like size. A single 2-joint shaft is used on model 43, and a 2-piece 3-joint shaft on model 40, operating direct through a self-aligning bearing, hung from the frame cross-member. The gear ratios are 10⅓ to 1 and 14⅔ to 1, respectively, and Hotchkiss drive is used.

The controller, identical on each model, is of Milburn design of the series type with special removable contacts arranged for 4 speeds. Under normal driving conditions the speed of model 43 under high voltage postion is from 17 to 18 miles per hour with a battery radius of from 35 to 45 miles. Operated in low voltage position, this speed is reduced from 10 to 11 miles per hour while the battery radius is increased from 50 to 60 miles. Under the same conditions, the model 40 offers a speed of from 14 to 15 miles per hour with a battery radius of from 35 to 45 miles when the controller is in high, or from 8 to 9 miles per hour with an increase in battery radius of from 55 to 65 miles when running in low.

Demountable pneumatic cord tires and rims are standard for both models and are interchangeable; 32 by 4½-inch on model 43; 32 by 4½-inch on the front wheels of model 40 with 33 by 5-inch on the rear wheels.

The strength and durability of both chassis have been increased, yet the weight reduced through the use of pressed-steel and modern engineering practice. The weight of the model 43, excluding body and battery is 1,690 pounds, model 40 weighing 1,990 pounds.

Contrary to usual practice, the chassis are completely equipped in every way to insure simple and intelligent operation. The user need purchase no extras.

An exclusive feature is the "Hi-Lo" switch. The purpose of this switch is extra safety when operating in congested quarters, and the conservation of battery energy, as its use enables the truck operator to adapt his speed and mileage radius more economically to the particular requirements of the route being covered. On routes where frequent short-distance stops are necessary, such as deliveries to several houses in one block, Milburn trucks are most efficiently operated in the "Lo" position as this uses minimum current and at the same time increases the mileage per battery discharge. In traveling to and from each delivery section or over routes where the stops are compartively few and far between, a change of the switch into "Hi" position immediately increases the speed of the truck, thus saving valuable delivery time.

The battery equipment of both the ½-ton and the 1-ton unit is optional according to the dealer's recommendation or user's selection. Exide or Philadelphia installations consist of 42 cells, but may vary in number of plates. Edison installation requires 60 cells. Lead batteries are arranged in two like sized trays, exchange system, and are mounted with rollers on tracks, half under the hood, half under the seat. This exchange system makes care of the battery a very simple matter and has the further advantage of enabling the user to exchange instantly with a second set of batteries for double mileage. Edison batteries are fixed.

EXPORTS OF MOTOR VEHICLES AND PARTS, NOVEMBER, 1921.

COUNTRIES.	MOTOR TRUCKS—Complete. (No.)	(Value)	Chassis. (No.)	(Value)	PASSENGER-CARS—Complete. (No.)	(Value)	Chassis. (No.)	(Value)	PARTS. (Value)
Azores, etc., Islands	..	.....	...	.....	1	$ 350	1	$ 300	.....
Belgium	25	$ 10,928	18	$ 6,012	39	27,791	10	4,371	$ 3,111
Bulgaria	..	.....	...	.....	....	.....	...	.....	62
Denmark	..	.....	...	.....	13	17,375	...	.....	91,963
Finland	..	.....	...	.....	....	.....	...	.....	1,559
France	1	1,240	...	.....	4	9,800	...	.....	8,350
Gibraltar	..	.....	...	.....	....	.....	...	.....	26
Greece	8	3,556	...	.....	34	15,986	...	.....	5,476
Jugoslavia	..	.....	...	.....	....	.....	...	.....	2,606
Iceland, etc., Islands	..	.....	...	.....	2	2,500	...	.....	299
Italy	..	.....	...	.....	....	.....	...	.....	3,068
Malta, etc., Islands	..	.....	...	.....	1	383	...	.....	1,036
Netherlands	29	12,675	...	.....	21	24,416	1	1,000	27,071
Norway	..	.....	1	1,576	....	.....	...	.....	5,336
Poland and Danzig	..	.....	...	.....	1	700	...	.....	4,717
Portugal	..	.....	...	.....	....	.....	...	.....	8,126
Roumania	..	.....	...	.....	....	.....	...	.....	6,295
Spain	..	.....	...	.....	5	4,911	1	375	15 538
Sweden	3	2,293	2	2,280	81	83,208	2	1,456	12,816
Switzerland	..	.....	...	.....	8	11,366	...	.....	3,467
Turkey in Europe	..	.....	...	.....	4	5,162	...	.....	687
England	..	.....	11	11,349	54	70,471	61	27,957	573,668
Scotland	..	.....	...	.....	....	.....	...	.....	781
Ireland	..	.....	...	.....	1	385	...	.....	7,322
British Honduras	..	.....	...	.....	2	2,025	...	.....	295
Canada	21	35,592	22	38,509	180	235,883	12	11,808	651,649
Costa Rica	..	.....	...	.....	....	.....	...	.....	778
Guatemala	..	.....	...	.....	10	12,735	...	.....	3,714
Honduras	..	.....	2	625	1	372	...	.....	1,699
Nicaragua	..	.....	...	.....	....	.....	...	.....	202
Panama	1	437	...	.....	28	26,842	1	1,250	3,175
Salvador	1	3,166	...	.....	9	2,218	...	.....	1,315
Mexico	69	38,809	26	20,424	424	331,063	15	7,399	116,950
Newfoundland, etc.	..	.....	...	.....	....	.....	...	.....	454
Barbados	..	.....	...	.....	6	3,730	...	.....	1,594
Jamaica	3	2,694	3	1,887	32	21,704	1	728	9,483
Trinidad, etc.	11	6,387	...	.....	17	7,336	...	.....	3,239
Other British W. Indies	2	818	...	.....	9	9,297	...	.....	1,432
Cuba	7	2,923	...	.....	33	43,727	...	.....	132,116
Virgin Islands	..	.....	...	.....	....	.....	...	.....	582
Dutch W. Indies	..	.....	...	.....	6	2,415	...	.....	686
French W. Indies	..	.....	...	.....	....	.....	...	.....	1,353
Haiti	1	437	...	.....	11	9,238	...	.....	2,967
Dominican Republic	1	3,000	...	.....	3	1,683	...	.....	6,253
Argentina	1	5,221	1	3,600	67	54,744	...	.....	558,262
Brazil	1	5,150	...	.....	19	10,672	...	.....	9,352
Chile	2	4,286	2	5,207	2	1,801	...	.....	4,840
Colombia	..	.....	...	.....	15	10,751	4	1,890	11,007
Ecuador	..	.....	...	.....	....	.....	...	.....	1,264
British Guiana	..	.....	...	.....	3	2,424	...	.....	3,329
Dutch Guiana	..	.....	...	.....	....	.....	...	.....	464
Peru	..	.....	...	.....	....	.....	2	920	11,543
Uruguay	..	.....	10	2,990	2	3,000	...	.....	12,084
Venezuela	..	.....	...	.....	20	14,611	...	.....	5,639
Aden	..	.....	...	.....	....	.....	...	.....	136
Armenia, etc.	..	.....	...	.....	12	4,519	...	.....	.....
China	..	.....	4	3,012	2	3,500	1	1,520	3,657
Kwantung	..	.....	...	.....	1	1,107	...	.....	.....
Chosen	..	.....	...	.....	....	.....	...	.....	3,000
British India	1	1,164	1	1,116	68	62,537	...	.....	24,814
Straits Settlements	...	.....	...	.....	....	.....	...	.....	3,300
Other British E. Indies	..	.....	...	.....	10	7,294	...	.....	2,036
Dutch East Indies	..	.....	...	.....	5	6,250	...	.....	1,250
French Indo China	...	.....	...	.....	....	.....	...	.....	833
Greece in Asia	..	.....	...	.....	....	.....	...	.....	846
Hejaz, Arabia, etc.	..	.....	...	.....	....	.....	...	.....	1,487
Hongkong	..	.....	...	.....	4	5,358	...	.....	80
Japan	2	7,310	50	21,500	19	27,927	...	.....	32,137
Palestine and Syria	..	.....	...	.....	63	27,673	...	.....	1,540
Siam	..	.....	...	.....	6	3,972	...	.....	292
Australia	6	11,503	37	42,590	45	55,208	340	272,624	33,754
New Zealand	..	.....	1	300	85	93,414	...	.....	21,403
Other British Oceania	..	.....	...	.....	4	4,848	...	.....	1,355
French Oceania	..	.....	...	.....	....	.....	...	.....	1,851
Other Oceania	..	.....	...	.....	....	.....	...	.....	1,279
Philippine Islands	17	12,670	1	1,985	15	19,825	...	.....	5,002
Belgian Kongo	..	.....	5	2,185	....	.....	...	.....	6,400
British West Africa	9	17,024	1	1,194	5	4,200	2	2,779	17,072
British South Africa	..	.....	...	.....	76	73,610	...	.....	23,457
British East Africa	..	.....	...	.....	1	1,857	...	.....	1,143
Canary Islands	3	1,311	3	3,959	11	12,945	...	.....	3,839
French Africa	..	.....	...	.....	....	.....	...	.....	2,345
Morocco	..	.....	...	.....	6	5,732	...	.....	7,100
Egypt	..	.....	...	.....	10	4,292	5	1,670	3,916
Portuguese Africa	1	1,500	...	.....	....	.....	...	.....	.....
Totals	226	$192,094	201	$172,300	1,616	$1,509,143	459	$338,047	$2,546,424

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Smith Wheels hold their supremacy, now as before. They were in the front ranks of war in ever increasing numbers. This gave them a perfect score. In peace their results are the same.

Smith Wheels have always been of the same design, manner of making, and material used. Why? Because their performance could not be bettered.

Today there are more Smith Wheels made and sold than all other makes of metal truck wheels combined. They dominate the highways.

Although superior in appearance and quality to all others, and although their price is now less than their pre-war price, their performance, and nothing else, is what sells them.

The Rigid Type and Cushion Type of Smith Wheels vanquish all comers. Each performs perfectly its duties in their respective fields. The Cushion Type rides like a pneumatic.

If dealer, write us for Agency proposition.
If Truck user, write for particulars.
Truck Maker knows.

SMITH WHEEL
SYRACUSE N.Y. U.S.A.

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Northern Pacific Adopts Rail Motors for Branches

GASOLENE CARS CUT OPERATING COST

Fostered by the executives of the Northern Pacific Railroad in co-operation with W. F. Sailor of the International Motor Company, several trial trips were recently made of a new type of passenger-carrier which, it is said, may revolutionize rail transportation on branch-line runs. The vehicle which is arousing such unusual interest among leading railroad officials of the country is a specially designed Mack gasolene rail-car mounted on steel flanged wheels so that it can be operated on standard railroad tracks.

The experimental trips were made over the Northern Pacific route from St. Paul to White Bear, a distance of about 12 miles. This run includes a steep and winding grade almost 2 miles long, one of the most severe in the Northwest. When it is understood that two locomotives are required to pull a passenger train up this ascent, some idea of the severity of the test may be ascertained.

Twenty-three passengers were comfortably carried on the first trip, although the rated capacity of this car is 17 persons in addition to a baggage compartment. The rail-car quickly climbed the steep, curved incline, and completed the run of 12 miles to the entire satisfaction of every one of the railroad officials. After enthusiastically discussing the performance they had just witnessed, their unanimous opinion was that the experiment proved beyond a doubt that motorized carriers, properly equipped, can be used to profitable advantage in certain phases of railroad service.

When a second trip over the same route was made a few days later, the distance was covered in 29½ minutes, only 1½ minutes longer than it takes the Duluth Limited to make this run. Obviously, a small motor 'bus could not be expected to save time when competing with steam equipment, yet the railroad men who have carefully considered operating costs, strongly believe that gasolene rail-cars will effect a more vitally necessary saving—that of operating expense. Moreover, even under the most unfavorable conditions for running a gasolene machine, it has been found that the costs are much lower than those of steam-operated equipment. This saving in operating costs, combined with the comparatively small capital investment required, promises to be the salvation of many branch lines, some of which have had to discontinue service or will soon be compelled to do so because the expense of operating steam equipment far exceeds the revenues obtainable for the service rendered.

One of the results of these tests has been a radical step away from established railroad precedent recently taken by the Northern Pacific. A number of years ago, when James J. Hill ran his locomotive out of St. Paul, steam equipment was looked upon throughout the country as being the only logical answer to the transportation problem of the rapidly expanding Northwest. To-day his successor, Charles Donnelly, the present head of the Northern Pacific, is turning to the gasolene engine as an economical solution to one form of this transportation problem—short-haul passenger traffic—which has never been profitably solved by the conventional railroad equipment. Convinced of the advantages of gasolene motor-cars, the Northern Pacific now operates a Mack rail-car in regular service on a branch line, and expects shortly to install more of these cars in like and larger capacities. Another big railroad of the West, the Great Northern, is also planning to install gas-propelled rail-cars on its various branch lines.

In the East the New York, New Haven & Hartford Railroad will soon operate 3 such rail-cars. Many of the smaller railroads, such as the Narragansett Pier Railroad, Aberdeen & Rockfish Railroad, Sewell Valley Railroad and Stone Harber Railroad, have been successfully using motor equipment for some time.

EXPORTS OF MOTOR VEHICLES AND PARTS, DECEMBER, 1921.

	—MOTOR TRUCKS—				— PASSENGER-CARS —				
	Complete.		Chassis.		Complete.		Chassis.		PARTS.
COUNTRIES.	(No.)	(Value)	(No.)	(Value)	(No.)	(Value)	(No.)	(Value)	(Value)
Azores, etc., Islands	2	$ 874	1	$ 495	....	.....	...	.....	$ 2,987
Belgium	..	.....	15	6,557	43	$ 25,100	21	$ 7,690	6,073
Bulgaria	..	.....	...	.....	1	508	...	.....	533
Denmark	..	.....	...	.....	4	3,580	11	1,945	9,625
France	..	.....	...	.....	4	7,100	...	.....	96,291
Germany	..	.....	...	.....	....	.....	...	.....	9,660
Gibraltar	..	.....	...	.....	....	.....	...	.....	1,685
Greece	..	.....	...	.....	1	725	...	.....	3,924
Hungary	..	.....	...	.....	....	.....	...	.....	34
Italy	..	.....	...	.....	1	1,000	...	.....	5,185
Malta, etc., Islands	..	.....	...	.....	4	3,070	...	.....	686
Netherlands	22	9,615	12	5,245	22	15,440	2	5,600	9,275
Norway	..	.....	2	1,896	3	2,600	...	.....	16,489
Poland and Danzig	2	6,939	2	6,939	1	728	...	.....	1,180
Portugal	..	.....	...	.....	....	.....	...	.....	2,322
Roumania	..	.....	...	.....	....	.....	...	.....	950
Russia in Europe	10	9,700	...	.....	5	5,700	...	.....	286
Spain	..	.....	...	.....	25	28,883	2	4,386	20,135
Switzerland	..	.....	...	.....	1	1,500	...	.....	1,871
Turkey in Europe	..	.....	...	.....	....	.....	...	.....	47
England	..	.....	4	4,213	116	57,902	143	57,749	907,266
Scotland	..	.....	...	.....	....	.....	...	.....	201
Ireland	..	.....	...	.....	....	.....	...	.....	2,323
Jugoslavia, Albania	...	.....	...	.....	....	.....	...	.....	1,000
British Honduras	..	.....	...	.....	3	3,633	...	.....	44
Canada	15	15,333	19	28,545	162	199,212	4	8,800	797,465
Costa Rica	..	.....	...	.....	3	5,527	...	.....	1,658
Guatemala	..	.....	...	.....	4	3,824	...	.....	967
Honduras	..	.....	...	.....	5	3,896	...	.....	4,202
Nicaragua	..	.....	...	.....	1	750	...	.....	158
Panama	12	34,228	19	6,946	18	14,168	...	.....	1,777
Salvador	..	.....	...	.....	....	.....	...	.....	3,033
Mexico	31	29,424	34	11,272	426	375,022	...	.....	86,298
Newf'd'land & Labrador	..	.....	...	.....	....	.....	...	.....	275
Barbados	..	.....	...	.....	3	3,087	...	.....	1,054
Jamaica	2	1,285	...	.....	24	17,466	4	7,800	9,611
Trinidad and Tobago	..	.....	...	.....	5	4,046	...	.....	3,128
Other Brit. W. Indies	..	.....	3	1,311	14	9,020	...	.....	1,808
Cuba	22	16,445	1	1,862	86	113,503	...	.....	26,665
Virgin Islands of U. S.	1	365	...	.....	2	1,028	...	.....	2,759
Dutch West Indies	..	.....	...	.....	5	2,202	...	.....	1,141
French West Africa	..	.....	...	.....	1	640	...	.....	1,366
Haiti	..	.....	...	.....	2	1,140	...	.....	2,403
Dominican Republic	...	.....	...	.....	8	4,713	...	.....	3,333
Argentina	..	.....	...	.....	56	68,760	...	.....	158,967
Bolivia	..	.....	...	.....	1	4,000	...	.....	248
Brazil	1	2,000	1	1,607	22	24,487	...	.....	35,644
Chile	..	.....	2	874	....	.....	...	.....	4,727
Colombia	1	933	3	6,462	23	19,664	...	.....	13,726
Ecuador	2	974	2	404	2	767	...	.....	240
British Guiana	..	.....	...	.....	....	.....	...	.....	973
Dutch Guiana	..	.....	...	.....	4	2,573	...	.....	1,166
Peru	..	.....	...	.....	7	5,165	...	.....	8,848
Uruguay	..	.....	10	2,742	8	7,965	...	.....	11,772
Venezuela	5	2,185	...	.....	35	28,405	...	.....	6,015
Sweden	..	.....	5	13,471	19	20,531	2	1,456	20,740
Paraguay	..	.....	...	.....	....	.....	...	.....	1,835
Finland	..	.....	...	.....	....	.....	...	.....	1,716
Aden	..	.....	...	.....	....	.....	...	.....	281
China	3	8,250	8	4,000	28	36,206	...	.....	5,821
Kwantung, leased ter.	1	3,000	1	1,887	1	3,200	...	.....	165
Chosen	..	.....	...	.....	....	.....	...	.....	594
British India	4	4,569	12	14,764	112	113,106	5	5,328	34,250
Straits Settlements	..	.....	...	.....	....	.....	...	.....	6,212
Other Brit. E. Indies	..	.....	2	930	4	55,655	...	.....	1,043
Dutch East Indies	..	.....	1	1,458	64	94,533	...	.....	46,774
French Indo China	..	.....	...	.....	....	.....	...	.....	238
Greece in Asia	..	.....	2	734	6	2,112	...	.....	21
Hongkong	..	.....	...	.....	3	2,800	...	.....	415
Hejas, Arabia, etc.	4	5,880	...	.....	....	.....	...	.....	1,236
Japan	6	11,000	58	35,790	6	4,395	104	42,477	34,597
Palestine and Syria	..	.....	...	.....	57	33,426	...	.....	12,258
Siam	..	.....	...	.....	....	.....	...	.....	824
Australia	5	6,325	102	137,012	109	116,796	572	500,723	100,542
New Zealand	..	.....	4	6,602	51	45,556	2	2,064	27,149
Other British Oceania	..	.....	...	.....	....	.....	...	.....	1,179
French Oceania	..	.....	...	.....	1	800	...	.....	598
Other Oceania	..	.....	...	.....	....	.....	...	.....	760
Philippine Islands	..	.....	1	2,600	15	155,613	...	.....	34,214
Belgian Kongo	..	.....	10	4,371	....	.....	...	.....	248
British West Africa	..	.....	...	.....	5	4,219	...	.....	6,976
British South Africa	..	.....	7	8,147	100	101,332	...	.....	24,537
British East Africa	..	.....	...	.....	1	343	...	.....	1,824
Canary Islands	..	.....	...	.....	3	5,985	...	.....	12,919
French Africa	..	.....	...	.....	4	2,885	...	.....	3,784
Portuguese Africa	..	.....	3	1,311	10	4,941	...	.....	56
Spanish Africa	..	.....	...	.....	2	6,950	...	.....	335
Egypt	10	4,371	4	1,748	22	9,381	...	.....	7,098
Totals	161	$173,595	350	$322,195	1,784	$1,702,264	862	$646,018	$2,683,850

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Pre-eminent in the Mack line —The Heavy Duty Truck

And the light capacity Macks embody the same quality of materials and the same unsurpassed calibre of workmanship, the same balanced construction and a proportionate reserve of strength and power.

The complete Mack line is the most comprehensive that is offered the dealer today. It includes two standard models: A B of 1½, 2, and 2½ tons capacity, with option of six wheelbase lengths. The A C is of 3½, 5, 6½, 7½ tons, with option of nine wheelbase lengths. Also tractors to 15 tons capacity. In addition, special models are obtainable for every conceivable variety of municipal requirement.

We shall be glad to advise you whether or not there is available territory in your vicinity.

INTERNATIONAL MOTOR COMPANY
25 Broadway, New York

Mack TRUCKS

PERFORMANCE COUNTS

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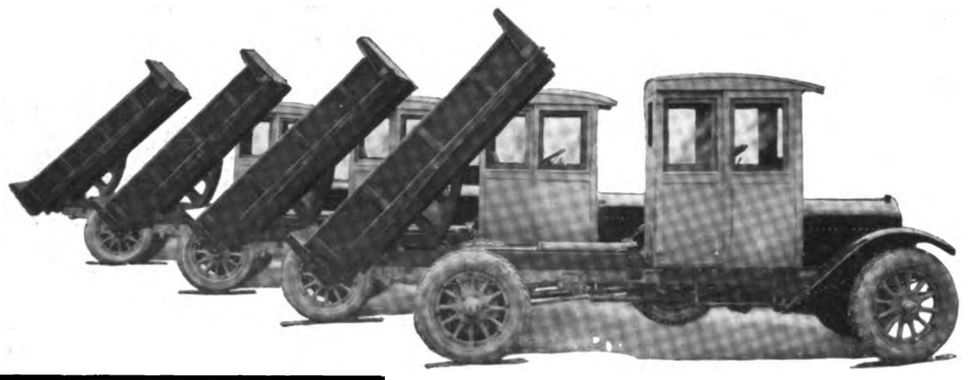

G. M. C. one-ton trucks fitted with the new Wood-Detroit Underbody Hoist. These Hoists are now being furnished in three sizes—for Ford Trucks, Speed-Wagons, and One-Ton Trucks.

The Body shown is the Convertible. As shown it is a perfect acting dumping unit. By lifting the sides off and substituting stakes and dropping the tailgate flush with the floor, a general-purpose stake body is made, for all kinds of hauling.

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Cleveland, Ohio—E. 36th St. and Cedar Avenue
Detroit, Mich.—2035 Gratiot Avenue
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Nashville, Tenn.—211-13 Second Avenue, S.
Indianapolis, Ind.—339-41 N. Capitol Avenue
Chicago, Ill.—3751 Wentworth Avenue
Milwaukee, Wis.—2815 Dunbar Place
Minneapolis, Minn.—University at 6th St., S. E.
St. Louis, Mo.—1112 N. 9th Street
Denver, Colo.—1751 Wazee Street
Salt Lake City, Utah.—141 Pierpont Avenue
Seattle, Wash.—1106 Pine Street
Portland, Ore.—53 4th Avenue
San Francisco, Cal.—51 Minna Street
Los Angeles, Cal.—165 E. Jefferson Street
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The New Wood-Detroit Underbody

To meet the need for a light, quick-acting hoist for the new type, high-speed trucks, we have developed the Wood-Detroit Underbody. This unit mounts in the frame, under the body, so no space is wasted—the body can be full length. It is light, yet very strong. Though speedy, it is simple and dependable—a hoist that is always ready to use, yet does not interfere with the efficiency of the truck when used for general hauling.

The Wood-Detroit line of Hydraulic Hoists is complete—there is a size and type for every chassis and every load. And the line of dump bodies is correspondingly complete. In addition to the all-purpose body shown above, there are standard bodies of all lengths, and heights, in different styles, for different commodities, and special bodies for all special needs.

Wood Hydraulic Hoist & Body Co.
4196 Bellevue Ave. DETROIT

SMITH
PRESSED STEEL FRAMES

Made in the Largest and best equipped frame plant in the World

A. O. SMITH CORPORATION
MILWAUKEE

Detroit Office: 708 Ford Building

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HEIL
Bodies and Hoists

Satisfactory from Fleet Owners Standpoint

Heil equipment has been installed on fleets ranging from three to fifty trucks all over the country and everywhere it is giving genuine satisfaction.

"Not one cent for repairs and I've dumped loads under conditions one would think impossible."—"Save more time and get better results with the Heil Hoist."—"Not one minute's trouble."—"An ideal unit for general dump truck work."—"Well satisfied."—"Can be depended on." These are a few opinions from fleet owners in California, New Jersey, Minnesota and Illinois.

Upper view—Four and one-half yard three batch body and Hydro Hoist. Dumping angle 54 degrees. Lower view—Two yard two batch body showing swinging partition (patents applied for.) Double acting tail gate is standard on all Heil Bodies.

Prices on all Dump Bodies were reduced December 1st. Send for new Price List and Catalog No. 120, just published. Write for Dealers proposition.

THE HEIL CO.

1140 Montana Ave. Milwaukee, Wis.

New York, Chicago, St. Paul, San Francisco, Sioux City, Cleveland, Washington, D. C.

Quality TANKS BODIES & HOISTS "Made by Heil"

Announcement

Being convinced that a fabric disc joint within its limitations offers certain advantages, we have supplemented our line of all-metal joints with a corresponding line of fabric disc joints and now offer them for early delivery.

The same quality of materials and excellence of workmanship which the trade attributes to our all-metal assemblies are incorporated in our fabric disc joint assemblies.

We solicit an opportunity to familiarize you with certain original features and details of our new design.

Making both lines, i. e., all-metal and fabric disc joints, you may rest assured that our recommendations will be made on the basis of *your* needs.

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Pioneer Builders of Universal Joints

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MOTOR TRUCKS

Model 33, 1½-2 Ton Bus

Operated by

STAR TRANSPORTATION COMPANY

MASON CITY, IOWA

SWIFT - ECONOMICAL - POWERFUL

Denby Motor Truck Company

DETROIT, U. S. A.

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Pierce-Arrow
TRUCKS

The Pierce-Arrow Motor Car Company
Buffalo, New York

2-ton $3200 3½-ton $4350 5-ton $4850 fully equipped

NOTICE

The publishers are in need of three copies of the May and June, 1920, issues of Power Wagon. Readers who have no further use for these numbers are requested to communicate with the Circulation Department, Power Wagon Publishing Company, 544 Lake Shore Drive, Chicago.

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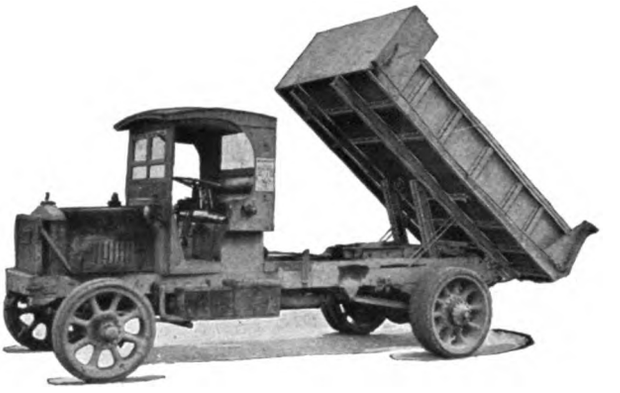

The Test of Service Proved the Superiority of

Horizontal Hydraulic Dumping Equipment

Horizontal Hydraulic Hoists and Steel Dumping Bodies have a nation-wide reputation for delivering uninterrupted service on every kind of hauling and dumping work, and are noted for their sturdy dependability under the hardest usage.

And this reputation has come from the uniformly excellent results they are attaining in many lines and under every sort of road condition.

There is a Horizontal Hydraulic Dumping Unit for every hauling and dumping job, and there is equipment for every make and model of truck.

Our engineering department is at your service, to help you solve your problem.

HORIZONTAL HYDRAULIC HOIST CO.
4196 Bellevue Ave. Detroit, Mich.

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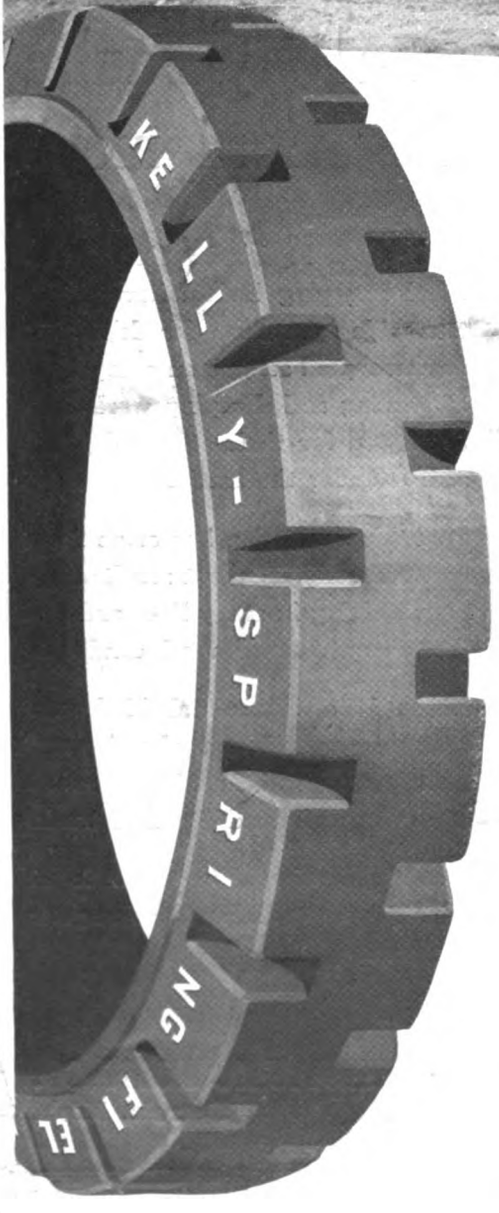

18 months in service--and still in good shape

The picture above shows the condition of the tires mentioned in Mr. Gray's letter, which appears below. Do the tires you are using stand up as satisfactorily?

"The two Caterpillar tires on the rear of my Clintonville, Wis., four wheel drive truck have been in continuous service for 18 months and look good for six months or perhaps a year more. I believe that this Caterpillar tire is equal in cushioning qualities to any pneumatic that I have ever seen.

"The fact that I have just changed the pneumatic tires on the rear of my Ford 1-ton truck to Caterpillars is proof that I believe them superior to pneumatics."

—Clarence C. Gray, St. Paul, Minn.

Caterpillars are made in sizes suitable for trucks of every type and weight

Kelly-Springfield Tire Co.

GENERAL SALES DEPARTMENT 1710 BROADWAY, NEW YORK

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LATEST ROLLER CHAINS HAVE SPECIAL QUALITY
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HIGH EFFICIENCY
ROLLER AND SILENT TYPE
CHAINS
also *Low* Cost per *Thousand Miles* of Service

Front End Motor Chain Drives

EXCEPTIONAL MILEAGE AND NEVER KNOWN
TO SKIP THE SPROCKET TEETH

THE WHITNEY MFG. CO.
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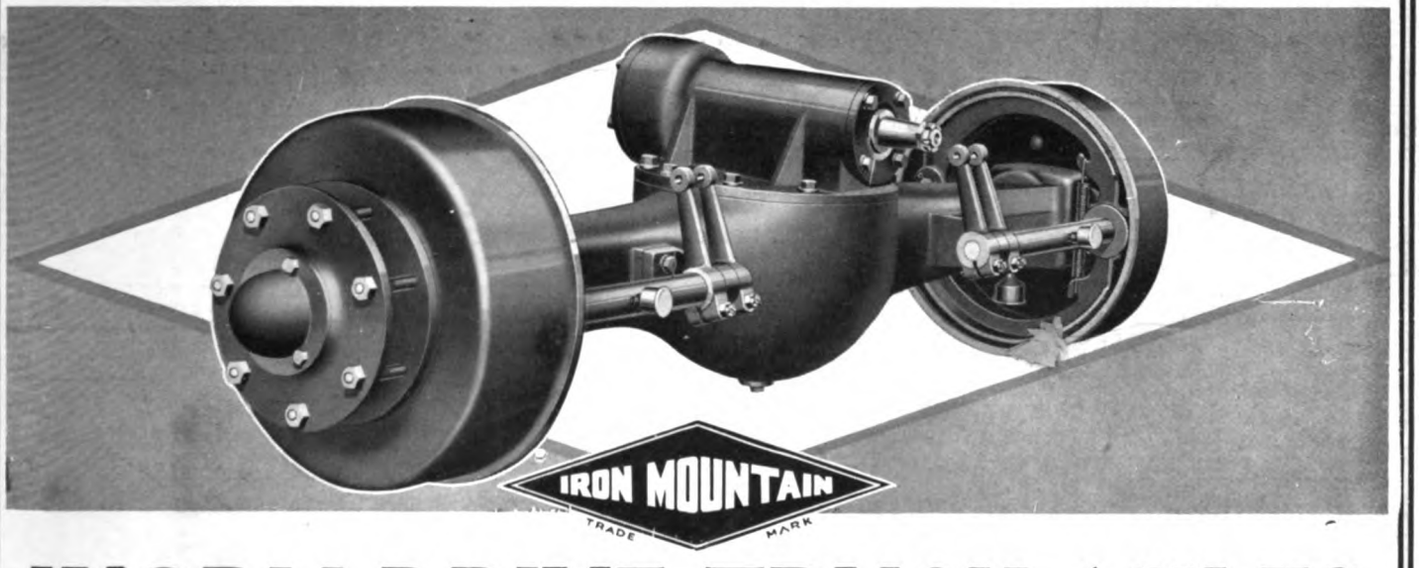

WORM DRIVE TRUCK AXLES

¾, 1, 1½ and 2½ Tons. Designed Right—Built Right.

Guaranteed to give 100% satisfaction in strength and service. Tell us about your requirements and let us estimate your needs.

IRON MOUNTAIN CO., 927-1001 East Ninety-fifth Street, Chicago

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Lee Automatic End Dump Body

"NO HOIST"

DUMPING INTO THE MIXER SKIP

2-yard dual hopper body mounted on a 2-ton truck. Each hopper has a capacity of 1 yard. Each hopper dumps independently of the other. This permits the hauling of two complete charges for the mixer.

NOT A POWER DUMP

THIS body is not a power dump. It has no troublesome power hoist to get out of order; in fact, it has no hoist of any kind. It is built of steel throughout and is fastened to the chassis with U-bolts. No mechanical connections to running parts or no drilling of frame required.

This body is a quick dump. The time required can hardly be measured by a stop watch. The dumping angle is over 60 degrees so that the stickiest construction materials known, mixed concrete and asphalt, are dumped successfully.

THE LEE SYSTEM

of "batch charging" by trucks is now universally accepted as the standard method of handling the material in building concrete roads. We developed this system and put it across almost single handed against the strenuous opposition of the manufacturers of industrial railways, etc. We have helped the motor truck to keep its proper place in the road building industry.

Our literature on this subject is most complete in describing not only the contracting methods to be followed, but in citing numberless examples of economical road construction done by various contractors during the past few years, by the use of Lee equipment and methods. Write for our Road Building and Paving Contractors' Hand Book.

LEE MOTOR TRUCK TRAILERS

We build the largest and most complete line of motor truck trailers manufactured in this country. This includes all types and sizes of four wheel trailers, semi-trailers, pole and logging trailers, etc. This enables us to recommend the best equipment for any particular job without being hampered by an incomplete line. Our whole idea is to help make the motor truck pay. If you have a special haulage problem write us about it.

LEE TRAILER & BODY CO.

2343 South La Salle Street **Chicago, Ill., U. S. A.**

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POWER WAGON

NUMBER 208 CHICAGO, MARCH, 1922 Price 25 Cents

THE JOHN CRERAR LIBRARY MAR 8 1922

Unique responsibility backs every genuine SPECIALIZED truck

Visualizing the manufacturing method that produces genuine SPECIALIZED trucks emphasizes the vast responsibility that insures their excellence. For back of the builder of a SPECIALIZED truck and back of his guarantee, are the great unit manufacturers of the automotive industry. These organizations which have SPECIALIZED on perfecting individual units, reinforce the guarantee of the truck builders by standing squarely behind their own products. Thus, the units that make up a genuine SPECIALIZED truck are guaranteed both individually and collectively.

This responsibility behind high-grade SPECIALIZED vehicles is leading reputable dealers to ally themselves with the sale of SPECIALIZED trucks. These dealers appreciate the merits of SPECIALIZED vehicles. They understand the advantages of parts-distributing stations that dot the world. And they *know* that automotive experience daily emphasizes the superiority of trucks that embody only units of *guaranteed* dependability—such units, for instance, as the motor that bears on its crankcase that ultimate symbol of SPECIALIZATION—the Continental Red Seal.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, U. S. A. Factories: Detroit and Muskegon

Largest Exclusive Motor Manufacturers in the World

Continental Motors

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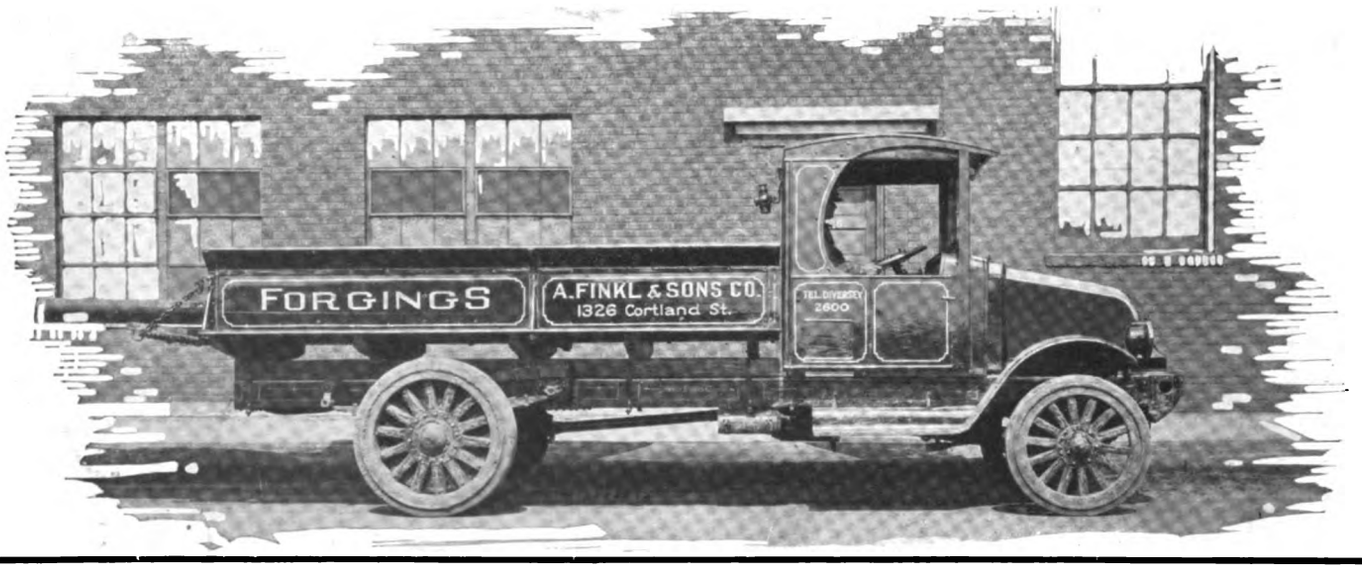

International Motor Trucks

An Outstanding Success

From Dealers' and Owners' Point of View

PROSPECTIVE dealers in high-grade motor transportation will find it decidedly worth their while to make a study of the present full line of International Motor Trucks and of the Service that goes with these trucks.

Internationals are today at work throughout the length and breadth of the land. Their practical hauling merit has achieved for them a phenomenal popularity in all lines of business. **Dealers have shared in this success.**

In the important matter of after-sale co-operation, we maintain that International Service has been developed to a degree of usefulness **absolutely unequalled.** Owners of Internationals are assured that their trucks will be kept right through our inspection service whereby road engineers from our many branches inspect trucks regularly without cost. This policy, carried out faithfully to the letter, creates loyalty and brings buyers. **The dealer shares the fruits of this policy.**

The Full Line of Internationals, ranging from the 1,500-lb. Speed Truck to the 10,000-lb. heavy-duty unit, comprises eleven sizes, with bodies and equipment for all requirements. At present prices the Line offers to **all** buyers the maximum in **low-cost transportation.**

Many dealers have found in the International Motor Truck contract the road to profitable, substantial success. May we send you further details? Write to the Chicago Office.

International Harvester Company

of America

(INCORPORATED)

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Branch Houses in 92 Principal Cities

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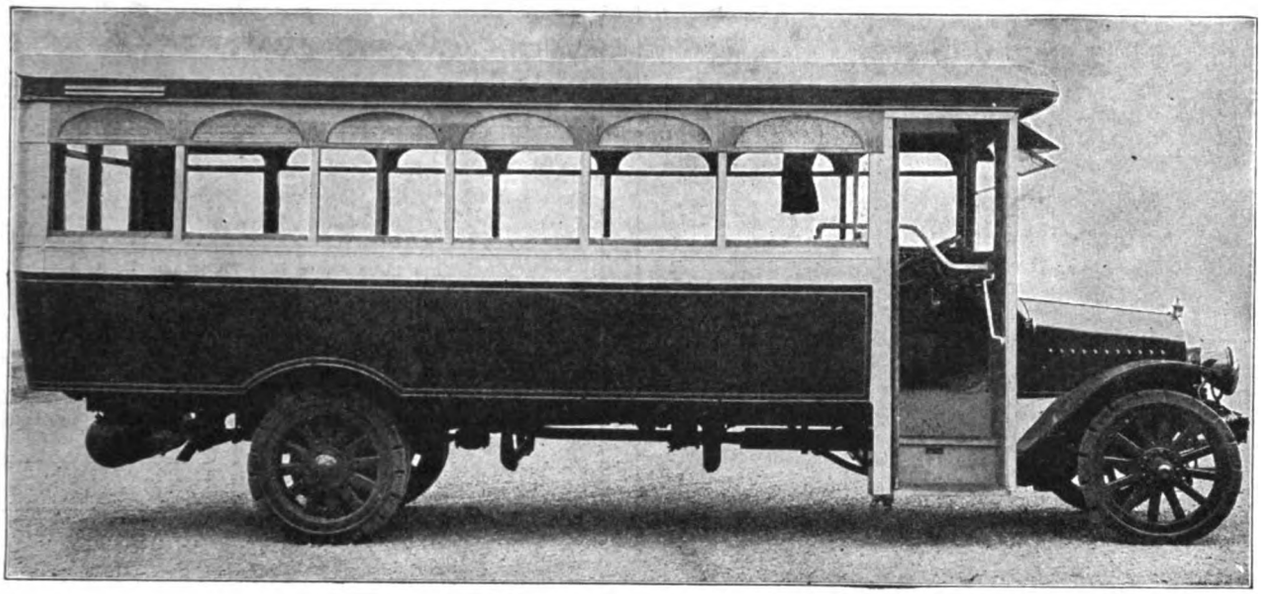


The Mack Rubber Shock Insulated Bus Offers:

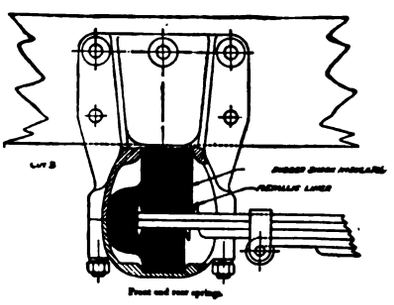
—Riding comfort equal to that obtained with pneumatic tire equipment.

—Greater stability and lower center of gravity.

—An increase in mile life.

—A lowered maintenance.

—The elimination of a spare tire and a reduction in tire investment.



THE ends of the springs are imbedded in blocks of rubber which are carried under compression in housings attached to the spring brackets. Note in this construction the evidence of characteristic Mack strength.

In adding this special Shock Insulated Bus to the already comprehensive line of Mack Trucks we feel that we have placed in the hands of the dealer the ultimate in Bus equipment.

We shall be glad to inform you of the territory still open.

INTERNATIONAL MOTOR COMPANY
25 Broadway, New York

Branches owned by this company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

PERFORMANCE COUNTS

Capacities: 1½ to 7½ tons.
Tractors to 15 tons.

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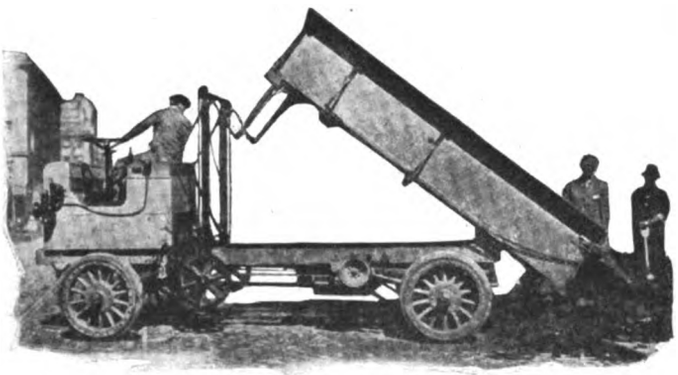
1908



A photographic reproduction of the original Hough Mechanical Hoist, from a write up in the Power Wagon, December, 1911.

The two pictures show the evolution of

THE

Hough Mechanical Hoist

The period since 1908, when the first Hough Mechanical Hoist with dump body and double-action tail gate was built and sold, represents fourteen years of development and constant application of a proven mechanical principle.

1922

The modern Hough Mechanical Hoist with high-lift attachment installed on a Packard truck, 1922.

POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

Published monthly by

THE POWER WAGON PUBLISHING COMPANY

544 Lake Shore Drive, Chicago, U. S. A.

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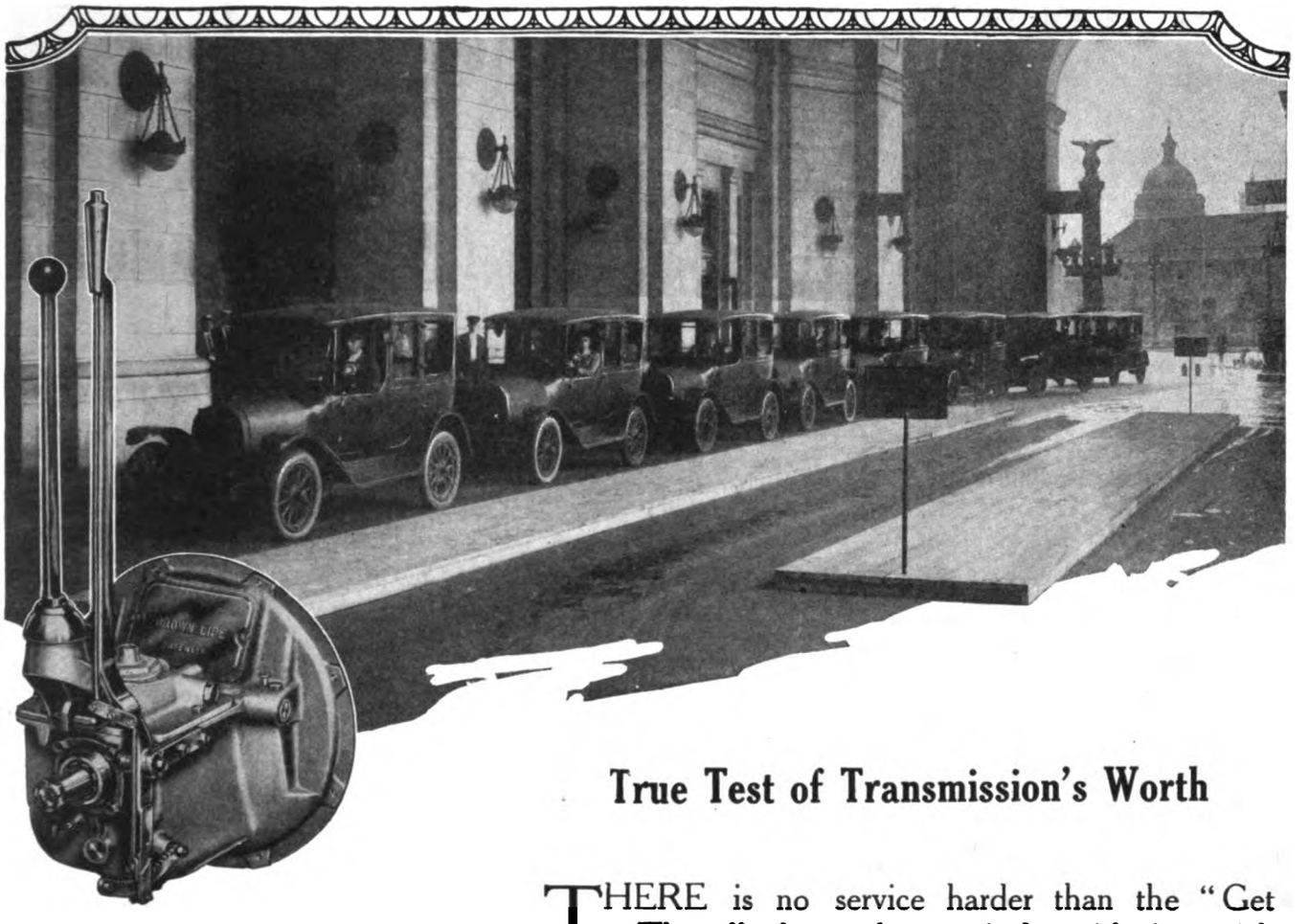

True Test of Transmission's Worth

THERE is no service harder than the "Get There" duty of a taxicab, with its quick stops and starts, abrupt shifting of gears, and high speed over all pavements in all weathers, yet the profitable life of these sturdy little vehicles is well over a quarter of a million miles.

These taxicabs, as well as those for 142 other cities, all have Brown-Lipe Gear Clutches and Transmissions.

BROWN-LIPE-GEAR TRANSMISSIONS

BROWN-LIPE-CHAPIN DIFFERENTIALS

Both at Syracuse, N.Y.

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1922 Complete Line Autocar Motor Trucks

Economical Transportation Independence for Every Line of Business

New 4 cylinder 5 ton Heavy Duty Autocars

Wheelbase lengths	120 ins.	156 ins.
Overall capacity (chassis, body and load)	22,000 lbs.	22,000 lbs.
Unladen chassis weights only	7200 lbs.	7400 lbs.
Prices (chassis)	**$3950**	**$4100**

New 4 cylinder 2 ton Heavy Duty Autocars

Wheelbase lengths	114 ins.	138 ins.
Overall capacity (chassis, body and load)	14,000 lbs.	14,000 lbs.
Unladen chassis weights only	5200 lbs.	5350 lbs.
Prices (chassis)	**$2950**	**$3075**

Standard 2 cylinder 1½-2 ton Autocars

Wheelbase lengths	97 ins.	120 ins.
Overall capacity (chassis, body and load)	11,000 lbs.	11,000 lbs.
Unladen chassis weights only	3600 lbs.	3700 lbs.
Prices (chassis)	**$1950**	**$2050**

Standard 2 cylinder 1½-2 ton Autocars (Rebuilt)

Wheelbase lengths	97 ins.	120 ins.
Overall capacity (chassis, body and load)	11,000 lbs.	11,000 lbs.
Unladen chassis weights only	3600 lbs.	3700 lbs.
Prices (chassis)	**$1650**	**$1750**

Prices F. O. B. Ardmore

Standard 2 cylinder 1½-2 ton Autocars (Reconditioned)

Wheelbase lengths	97 ins.	120 ins.
Overall capacity (chassis, body and load)	11,000 lbs.	11,000 lbs.
Unladen chassis weights only	3600 lbs.	3700 lbs.

Prices (chassis) . $1100 to $1400

Standard bodies for heavy and light hauling, dumping and delivery

THE AUTOCAR COMPANY, Ardmore, Pa., Established 1897

Autocar

Wherever there's a road

Please mention "Power Wagon" when writing to advertisers.

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POWER WAGON

Vol. XXVIII. CHICAGO, MARCH, 1922. No. 208

68,606 Trucks, 789,415 Cars Built in Last Half of 1921

YEAR'S PARTS TRADE $238,074,000

Particulars regarding the extent of motor truck and other motor vehicle production for the year 1921 are now available. They show that the production of trucks last year was at the rate of 46 per cent. of that of 1919, the comparison being based on monthly averages, and 45 per cent. of that of 1920. During the last half of 1921 the production of trucks and cars was as follows:

Month.	Trucks.	Cars.
July	10,761	165,575
August	13,076	167,705
September	13,645	144,669
October	12,810	134,734
November	10,009	106,042
December	8,305	70,690
Total	68,606	789,415

These figures represent the results of investigations made by the Department of Commerce, and include the production of all members of the National Automobile Chamber of Commerce and the chief makers who are not members of that body.

The following data, derived from the reports of the N. A. C. C., show the shipments of motor vehicles of all kinds from motor truck and passenger-car factories.

Month.	By Railroad. (Car-loads)	By Highway. (Machines)	By Boat. (Machines)
January	6,485	3,185	93
February	9,896	7,507	99
March	16,287	9,939	75
April	20,187	14,197	1,619
May	18,608	15,193	2,381
June	20,269	18,834	3,947
July	19,514	15,533	3,726
August	20,758	15,218	3,595
September	19,002	13,840	2,959
October	17,717	12,926	2,214
November	14,240	10,505	1,402
December	12,100	7,500	134
Total	195,153	144,377	22,244

The parts-making business shows the following data for the year, as disclosed by reports to the Motor & Accessory Manufacturers' Association:

Month.	Sales.	Accounts Past Due.	Notes Outstanding.
January	$ 6,265,000	$8,100,000	$4,360,000
February	10,409,000	6,717,000	6,063,000
March	20,120,000	5,604,000	5,070,000
April	26,747,000	5,352,000	5,371,000
May	26,782,000	4,515,000	4,470,000
June	22,714,000	4,731,000	4,007,000
July	23,096,000	5,242,000	3,690,000
August	23,398,000	4,349,000	3,495,000
September	23,142,000	4,359,000	3,678,000
October	22,063,000	4,513,000	3,464,000
November	18,998,000	4,352,000	3,662,000
December	14,350,000	4,220,000	3,384,000
Total	$238,074,000	.....	.....
Average	18,173,000	5,171,000	4,226,000
Percentage of January	317	64	97

Durant May Make Truck

The statement that W. C. Durant has accepted a contract to build a 4-cylinder 5-passenger touring-car to retail at $348 and the further announcement that he would probably later offer a motor truck and a light delivery wagon have started rumors to the effect that his contract is made with certain large parts makers who are anxious to provide a vehicle that will compete with the Ford products. Some have said that these parts makers are the same as those who recently announced a coöperative service plan, namely, Continental Motors, Timken-Detroit Axle, Brown-Lipe Gear, Borg & Beck, and Spicer. Confirmation is lacking.

Ford—Pierce-Arrow Rumor Denied

Rumor that Henry Ford is buying control of the Pierce-Arrow Motor Car Company is denied by M. E. Forbes, vice president and general manager of Pierce-Arrow, who says:

"There is absolutely no foundation for the report. Unless it is intended to facilitate operations of manipulators of the stock market, I can not imagine where the rumor connecting Ford with our plant originated."

Mr. Forbes states that 3,200 men are on the Pierce-Arrow pay-roll and orders are increasing.

New Truck Prices

The following changes in the list prices of motor truck chassis have been announced since the publication of the last issue of POWER WAGON:

Truck.	Old Price.	New Price.	Reduction.
Dodge, ½-ton, screen body	$1,035	$ 880	$ 155
Dodge, ½-ton, panel body	1,135	980	155
Garford, 3½-ton	4,300	3,750	550
Garford, 5 -ton	5,200	4,500	700
Garford, 7½-ton	5,500	5,200	300
Master, 1½ - ton, worm-drive	2,690	2,290	400
Master, 2½ - ton, worm-drive	3,290	2,890	400
Master, 2½ - ton, Walker drive	3,540	3,190	350
Master, 3½ - ton, worm-drive	4,190	3,990	200
Master, 3½ - ton, Walker drive	4,640	4,290	350
Master, 5-ton, worm-drive	5,290	4,990	300
Master, 5-ton, Walker drive	5,440	5,090	350
Master, 6-ton tractor	3,740	3,390	350
Menominee, 1 -ton.	2,080	2,000	80
Menominee, 1½-ton.	2,725	2,475	250
Menominee, 2 -ton.	3,245	2,875	370
Menominee, 3½-ton.	4,270	3,800	470
Menominee, 5 -ton.	5,450	4,850	600
Packard, 2-ton, EC.	3,500	3,100	400
Packard, 2-ton, EX.	4,000	3,500	500
Ward La France, 2½-ton	3,590	2,990	600
Ward La France, 3½-ton	4,690	3,990	700
Ward La France, 5-ton	5,590	4,590	1,000

Big Part of Bonus Burden May Hit Motor Transport

$50,000,000 LEVY BEING DISCUSSED

Another $50,000,000 would be levied on truck and car users as part of the program to secure funds for a soldiers' bonus, according to plans tentatively approved by the special tax section of the House Ways and Means Committee, which suggests 25 cents per horse-power. An additional $70,000,000 would be collected in great part from truck and car users by the proposal to tax gasolene 1 cent per gallon. Other levies suggested include $64,000,000 on stock and bond transactions; $75,000,000 on theater admissions; $30,000,000 on cigarettes and tobacco; $20,000,000 on real estate transactions and $20,000,000 through an increased parcel-post rate, or a total of $329,000,000.

"The sources to which the committee has turned to secure this revenue indicate an entire misconception of the essential uses of trucks and cars," comments the statement of Alfred Reeves, general manager, National Automobile Chamber of Commerce.

All should be called upon to share the cost of any soldiers' relief measure which the government may decide upon. The proposed measures would raise $120,000,000, or one-third the total amount needed, from truck and car owners and other users of gasolene.

"Three million farmers using trucks and cars will feel the burden of the proposed 25 cents per horse-power tax on motor vehicles and of the proposed 1 cent per gallon tax on gasolene. The farmers will be hit again by the gasolene tax in their use of stationary engines for pumping, lighting, and other farm uses. Motor truck and car owners already pay more than $300,000,000 in special taxes annually. A very small proportion of motor vehicles are used chiefly for recreation, and the proposed burdens, therefore, would fall chiefly on essential transportation."

Developments up to this time show the National Grange and the American Farm Bureau Federation joining heartily in opposition to the tax plan and to prevent further unjust taxation of any kind on trucks and cars, presentation in person by representatives of the N. A. C. C., the American Automobile Association and farm organizations to the House Ways and Means

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and the Senate Finance Committees, formal hearings demanded and being insisted upon, but up to this time refused, the American Association of State Highway Officials urging its members to oppose further encroachment on highway funds of states and all automotive organizations actively protesting, as well as the National Association of Manufacturers.

The board of directors of the Motor & Accessory Manufacturers' Association, representing four hundred of the principal manufacturers of equipment for the automotive industry, has gone on record in favor of "any effort of the government to compensate and otherwise aid soldiers and sailors who were disabled in the war." Strong objection, however, is expressed the proposed soldiers' bonus bill and the contemplated program of taxes. To say that motor transportation is an economic essential for twentieth century life," said Mr. M. L. Heminway, general manager of the association, "is no longer to argue or preach propaganda; it is merely to state an established fact. As a large factor in the nation's industrial organization, the automobile industry would of course not object to assuming its equitable share of any public expenditure, but there is no justification for clearly unfair discrimination against our manufacturers, their dealers, agents and customers. The proposed drastic tax on gasolene and the suggestion for a tax on horse-power are not taxes on the automotive industry. They are unduly heavy taxes on transportation; they are taxes on the entire community, taxes on the essential pursuits of business and, moreover, primarily taxes on farmers of the United States, who are our greatest consumers of transportation. It must be remembered that there are now in force on motor vehicles and parts special taxes aggregating annually more than three hundred million dollars. The proposed tax program is a blow not to a few joy riders and pleasure seekers, but to millions of workers and producers."

C. C. Hanch, chairman of the N. A. C. C. Taxation Committee, in addition to his personal conferences at Washington, has filed with the president and every member of the cabinet and Congress a letter referring to President Harding's statement in his first message to Congress: "We are committed to . . . the abolition of iniguities and unjustifiable exasperations in the present [taxation] system." The letter states that but few of the minor iniquities were removed, while the most flagrant iniquities and discriminatory taxes were maintained, including special and discriminatory motor vehicle taxes which reached $257,000,000 in 1921 paid by 10,000,000 truck and car owners in addition to their general taxes; that it is not surprising the proposal to tax gasolene and automotive horse-power was received by the public with a distinct shock and justifiable resentment. The letter deals with the tax situation in a most comprehensive manner and concludes: "Instead of adding new forms of taxation we ask for a sane reduction in governmental expenditures to make possible the repeal of those discriminatory taxes which are retarding our return to normal conditions."

The various forms and amounts of tax collected from the motor industry and motor vehicle owners are shown in the following figures:

Federal Excise:		
Motor car	$64,388,000	
Motor truck	11,640,000	
Parts, tires, etc.	39,518,000	
		115,546,000
State Licenses: (Revised estimate of Bureau of Public Roads)		120,000,000
Gasolene Taxes:		
State		10,500,000
Municipal, etc.		11,000,000
Total special taxes		$257,046,000
*Personal Property Taxes: 38 states and District of Columbia		75,000,000

*The tendency in most states is to assess motor vehicles at full value, though placing only nominal valuation on other forms of personal property.

Fifteen states have an excise gasolene tax; in Oregon this is 2 cents per gallon; in Arizona, Arkansas, Colorado, Connecticut, Florida, Georgia, Kentucky, Louisiana, Montana, New Mexico, North Carolina, Pennsylvania, South Dakota and Washington, 1 cent per gallon. Bills are impending in six other states, Massachusetts, Maryland, New Jersey, Rhode Island, South Carolina and Virginia, in amounts varying from 1 to 3 cents per gallon. Most of the state legislatures which held sessions in 1921 increased registration fees.)

Nash Eliminates Distributers

The elimination of distributers in the handling of its truck business is among the features of new policies inagurated by the Nash Motors Company. The business will be conducted hereafter entirely with the dealers direct. Discussing the new truck policy, this explanation was made by C. B. Voorhis, vice-president and general sales manager:

"During the past five years it has been the policy of the Nash company to market both passenger-cars and trucks through Nash distributers, but our experience has demonstrated conclusively that the passenger-car business and the truck business are entirely separate and distinct. Therefore, while it will continue to be the policy of the company to handle passenger-cars through distributers in just the way we have done in the past, we have decided that it is wise and necessary to segregate our truck business entirely from the passenger-car business and we announce this new Nash policy for the marketing of our trucks."

It is understood that unusually attractive dicounts are being offered dealers.

Truck, Tractor, Car for $1,000

"Mr. Ford has said that he hopes to be able to cut the production costs of his machine to such a price that farmers can buy an automobile, a tractor and a truck for $1,000," said General Beach, chief of the Corps of Engineers of the United States Army, when he appeared before the House committee on military affairs, which is investigating the offer of Ford to take over the government property as Muscle Shoals. The present price of the three is $1,173. "I have every reason to believe that he aspires to go down in history as the man who did the most to develop the agricultural resources of his country and the agricultural possibility of the world."

45 Members of Truck Body

The new organization of truck makers, mentioned in these columns last month, has taken final shape and it is now known that it will supplant the old Motor Truck Manufacturers' Association and the National Association of Motor Truck Sales Managers and will conduct its work under the name of the National Association of Motor Truck Industries. The management of the body will be in the hands of Don Whittaker, who was manager of the sales managers' organization. Forty-five members have already been enrolled and half of these are members of the National Automobile Chamber of Commerce.

B. A. Gramm, Gramm-Bernstein Motor Truck Company; F. G. Elder, Day-Elder Motors Corporation, and Moie Cook, Service Motor Truck Company, representing the manufacturers' association, and H. T. Boulden, Selden Motor Truck Company; J. E. Tracy, Hicks-Parrett Tractor Company, and Homer Hilton, Winther Motor Truck Company, representing the sales managers' body, formed the group which developed the idea of the new organization. Upon ratification by the two memberships of the plan, a board of nine directors is to be elected by mail; these in turn, electing officers. In this way, it is hoped the enterprise can be got into organized form and into effective action with the least possible delay. A potential charter membership, from the two existing associations, of 45 men is reckoned upon. Dues of $300 a year are under discussion.

Packard Business Improves

During the current winter season Packard Motor Car Company is selling about 25 per cent. more trucks than during the corresponding period last year. Large business organizations have come into the market for trucks in the past few weeks and Packard has received orders for some good-sized fleets.

A substantial volume of truck replacement business is expected by Packard officials this year. Many prospective purchasers who have been holding back waiting for stabilization of prices appear to be convinced that lower prices are unlikely. Many other users have been operating trucks in such run-down condition that they soon will be forced to replace them.

Increased demand for trucks used in highway construction is expected since a larger sum will be available for this work during the coming year than ever before. New developments and extensions in the use of motor 'buses, intercity transport trucks and the rail motor should also favorably influence truck business.

Indications are that Packard production this year will exceed last year's output of 6,451 passenger-cars and 2,351 trucks.

Dorris 1-Tonner

The Dorris Motor Car Company, St. Louis, has added a 1-ton model to its line of trucks. It is known as K-2 and has a 4-cylinder engine, 4x5½, valves in the head, multiple-disk clutch, Bosch magneto and Westinghouse starting and lighting system. The wheel-base is optional at 120, 138 and 150 inches. Cord tires, 33x5-inch, are used all around.

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Truck Pneumatics on Small Rims Now Held Practical

U. S. FIRM ANNOUNCES NEW DESIGN

Striving for a wider range of applicability of the pneumatic tire to motor trucks of high load rating, the United States Tire Company has finally discovered that a cord pneumatic of a size as great as 36x10 inches can be applied successfully to a 16-inch rim. As a result of its experiments covering two years' testing under varying conditions of service, the company is now prepared to announce its intention of building a complete series of pneumatic tires for use with the small rim.

"In the last ten years practically the entire effort of the tire industry has been directed toward improvement of existing types and sizes of tires," said S. P. Thatcher, technical assistant to the president of the United States Tire Company, in discussing the new departure. "The outstanding advance has been in carcass construction, where parallel cords have taken the place of square-woven fabric. The trend in tire sizes has been from large outside diameters and small sections to smaller diameters and larger sections. Not so long ago we had 42x4 tires—today this size would look strange beside our 31x4 and 33x5. This trend has been brought about by the progress in automobile design which has tended toward lower center of gravity, better roadability and grace of line and, as in the past, the tire engineer has played a major part in solving the problems of the automobile engineer.

"The development of the pneumatic truck tire has been based on a 24-inch rim diameter. To-day we have the sizes 34x5, 36x6, 38x7, 40x8, 42x9 and 44x10 in commercial use, while experiments have been carried out with the 48x12. Tires up to and including the 40x8 have been fairly satisfactory, but above that size their use has not proved economical.

"Five years ago when these large pneumatics came into general favor, one objection to them, particularly in the very large sizes, was that they made it necessary to build the body platform so high that it was almost impossible to load from the ground. Many manufacturers of pneumatic truck tires aggravated this condition by building their tires much larger than the nominal size. For example, there are 40x8's that measure 43 inches in standing height while 44x10's have grown in stature until they measure over 48 inches. The United States Tire Company, on the other hand, believing this practice to be a tendency in a wrong direction, has held its tires as near to the nominal outside diameter as possible, while making the sectional width 10 per cent above nominal in order to increase load-carrying capacity.

"In addition to the problems of the motor truck, the ever-widening field of the motor bus made it apparent three or four years ago that the standard tire sizes could be improved upon, and the company began in 1919 the development of a new line of tires based on a 16-inch rim diameter which, when completed, will comprise the 26x5, 28x6, 30x7, 32x8, 34x9 and 36x10. The object, of course, was to permit the design of low-hung vehicles of large carrying capacity, and the 16-inch rim diameter was chosen on the advice of automotive engineers as being the smallest which would permit of sufficient differential ground clearance with types of rear axles not now practical because of the present large tire diameters.

"Patented processes of cord tire construction made it possible to build these tires, and the first size to be produced was the 36x10 'royal' cord, which went on test early in 1920. This tire on the rear wheel of a 3½-ton truck may appear grotesque, but the fact that it is as serviceable as a 44x10 leads to the inevitable conclusion that a 3½-ton truck or bus chassis can be designed as the automotive engineer has always wanted to design it. When that is done, the low, wide-section pneumatic will not look out of line, and the truck and bus will have gone forward a long distance toward the ultimate goal.

"The United States Tire Company has not yet placed these new sizes of tires on the market and is describing their development at this time for two reasons—first, for the purpose of advising the automotive engineer that one of his greatest problems is about to be solved and, second, with the hope of guiding tire size development as a whole. Other tire manufacturers must have sensed the need for a lower tire, and it would be an inexcusable economic blunder to standardize on any smaller rim diameter than the present 24-inch except the smallest that can be used. Automotive engineers have agreed that the 16-inch rim is the low limit."

American Express Buys 104 Electrics

With the recent purchase of 104 electric trucks the American Railway Express Company has still further strengthened its claim as the largest user of electrics in the world. The company now has in service throughout the United States more than 1,200 electrics in addition to its gasolene trucks and horse-drawn wagons.

The new equipment is for service in New York, Philadelphia and Buffalo. The New York allotment comprises 20 trucks of the 5-ton size; Philadelphia is to have fifty 2-ton trucks, while the 34 for Buffalo are of the 2-and 3-ton sizes.

It is planned to use the New York trucks on a 24-hour basis. This will be accomplished by means of standardized, interchangeable batteries, each truck being provided with two storage batteries. Thus, at the end of the first shift the exhausted battery will be removed and a freshly charged one put in its place. The battery boxes are designed for rapid changing and special devices for battery handling have been installed at the charging-stations.

A tax of 1 cent per gallon on gasolene went into effect in Louisiana the first of this year. It is expected that this tax will yield about $1,000,000 annually for highway work.

Scranton Dealers Aim to End Used Car Difficulties

STRICT PENALTIES WILL BE IMPOSED

Dealers of Scranton, Pa., have determined to solve the problem of what to do with used machines offered in trade for new ones, and to that end have adopted a set of rules, which will be promulgated among and enforced upon its members by the Scranton Motor Trades' association. Penalties will be imposed for violation of the regulations and fines will be assessed on those dealers who fail to attend the organization's weekly meetings. Details of the plan follow:

(a) Have each dealer submit quarterly, or on call by the secretary, to the secretary for compilation his opinion of the selling price of each model of his motor vehicles made in 1921-1920-1919-1918 and 1917. These values shall be compiled in loose-leaf form vest-pocket size and distributed to the members in good standing. (Estimates made by members of machines handled by non members shall be averaged and listed.) The basis for arriving at the above stated selling value of a vehicle shall be as follows:

List the average selling price of each model based on your experience of sales of machine in first-class condition, meaning: Not requiring painting for one year, upholstery and top not in need of repair or replacement, tires to have at least 10,000 miles value in combined tires and extras, mechanically fit for hard use. (Requiring no repairing).

(b) On the compilation of these values the books will be distributed to members and the information given therein used to determine allowances on "trade-ins" as follows:

First find the selling price of model in question. Deduct 15 per cent. for cost of selling and handling. Deduct cost of painting. Deduct cost of upholstery or top repair or replacement. Deduct cost of replacing tires to bring up to 10,000 miles value. Deduct cost of mechanical work necessary. You will then have the allowance you can safely make on the vehicle.

(c) No machine over five years old shall be traded.

(d) All vehicles sold for owner's account shall be sold for a 15 per cent commission.

(e) Machines not handled in Scranton or not listed in our selling price book shall use the Blue Book selling price value as a basis for figuring allowance.

(f) Each dealer must report weekly used car sales.

Each dealer must report weekly used car inventory.

These reports will be compiled and used as a check against over-valuation by dealers and as a barometer for the reducing or raising of allowance prices.

RULES.

1. A governing board of five members shall be appointed by the president to act until the next annual meeting.

2. Meetings shall be held each Tuesday. On the days the Scranton Automobile Trades Association meets, the meetings shall be held in conjunction with theirs at a time set by the president.

3. At these meetings on any question brought to a vote only one member of each dealer shall vote.

4. At these meetings shall be only the heads of each business or their representatives.

5. The cost of luncheon at these weekly meetings shall be paid by those attending.

6. At these meetings violations shall be reported, ideas exchanged and used car sales reports and inventories shall be delivered to the secretary.

7. The governing board shall have the power to act on all special cases not covered by these rules and duties and their decision shall be final.

8. It shall be the duty of the governing board to hire the necessary help and material to carry on the necessary work involved.

(*Continued on page 12.*)

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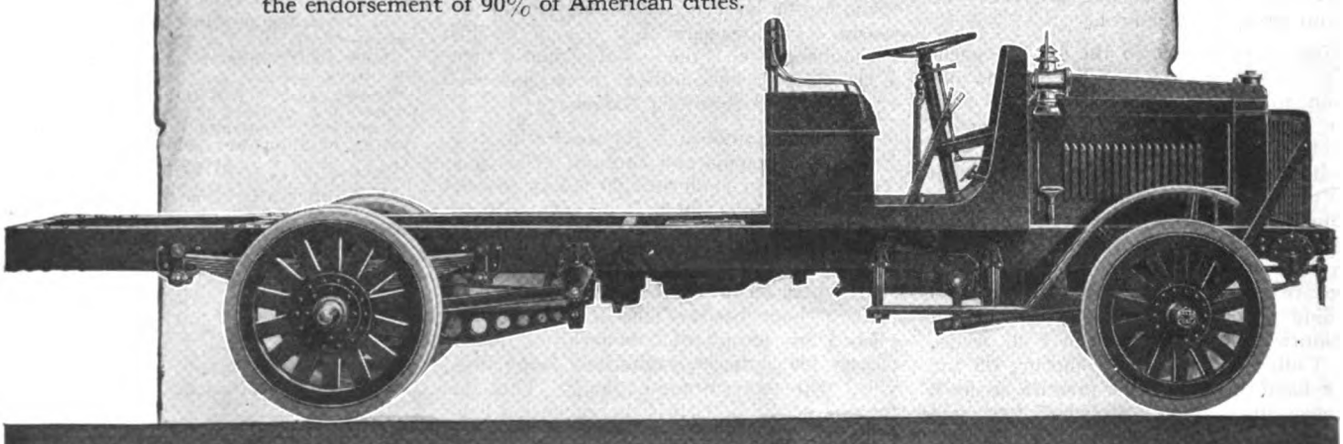
The Logical Reason
for
American-LaFrance Commercial Trucks

A noted statistician recently said that the products which would be successful this year were those with a logical reason for existing.

American-LaFrance Commercial Trucks have a logical reason for existing, because they will answer the demand for a commercial truck that will give the maximum amount of uninterrupted day-in and day-out service at a minimum cost.

This is assured by the fact that they are designed by the same engineers who, for fifteen years, have designed American-LaFrance Motor Driven Fire Apparatus which, by its constant readiness for service, strength, power and stamina, has won several world's records for endurance, and the endorsement of 90% of American cities.



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Time to Clean House

WHEN a young industry struggles heroically for more than fifteen years against the dangers of its commercial environment and then finds that, in spite of having attained enormous girth and stature, its system is wrecked by ulcers that sap its vitality, by strictures that impede its proper functioning, and by poisons that prevent its healthy development, the time has surely come for pathological diagnosis and drastic treatment, if death is to be avoided. The motor truck business is now in that very alarming and critical condition.

Let us look into this case rather closely and see what symptoms and causes can be discovered. First, in the field of production, we find nearly three hundred concerns making motor trucks for a market that absorbed less than 125,000 machines last year. Then, in back of this group, supplying it with parts and equipment of various kinds, are many hundreds of others whose activities are either partly or wholly devoted to this special kind of work. And lastly, in the field of distribution, we discover the astonishing total of twenty-odd thousand truck dealers engaged in the business of placing those vehicles in the hands of users. It will be profitable to consider and appraise these factors in the order named.

Two hundred and seventy-six motor truck makers of all kinds, and who and what are they? Mostly commercial adventurers and amateur mechanical tinkers, without large or permanent financial investment in the industry, who make a bid for the favor of prospective buyers by violating every sound practice of good business and by sacrificing all regard for future stability in their rush for immediate gain. Not one contribution of lasting worth do they make to the wholesome development of the trade which they seek to exploit; not the slightest concern do they evince for its future growth or firmness; no timidity do they disclose in wrecking the structure that has been so painstakingly erected for the industry's good.

Then view, with whatever complacency remains, the uncalled-for multiplicity of effort on the part of the too numerous parts and equipment makers. Finding no favor at the hands of the reputable and stable truck producers, they seek an outlet for their factory product by stimulating and encouraging the very kind of small-scale, sporadic and mischievous manufacture that every true friend of the industry must deplore. Commercial stupidity and waste are present here in even greater degree than among the truck makers; the scene shows men hoping to build up large and profitable organizations of production and sale on an annual output of a few hundred engines, transmissions or sets of wheels.

And now comes the most ludicrous and most tragic picture of all—that of distribution. Twenty-two thousand so-called truck dealers trying to extract a comfortable living from a business that, in the very nature of things, will never be able to support them all. Could anything be more absurd? Could anything more destructive of the best interests of the industry be conceived? Thousands of men lured every year from other walks of life by the promise of quick, certain and easy profits, tempted to enter a very difficult business for which they are not fitted and from which they can not possibly obtain (except in the rarest instances) the results they seek, and then thrown into the discard after complete disillusionment and after adding still further to the clutter and confusion that already exist in a much overcrowded field.

These thoughts are not new; they have occurred to every one who has made a sincere effort to study the industry's condition and to read its future; they must color all the industrial thinking of those who represent the solid and permanent body of the trade. This is, however, the first time that they have found public expression, and only the extreme gravity of the situation warrants such a brutal recital or what a few know and many suspect.

The motor truck industry is inflated beyond all reason. It is dangerously expanded in production and distribution. There is nothing in the history of the business or in its future to warrant the senseless increase in the number of producers and distributers that an examination of the trade discloses. The market does not now, never did, and never will offer sufficient opportunity to justify the scale of expansion that we have seen and, unless something is done to conserve the resources and to protect the interests of the best elements in the industry, the future of this business will be very insecure. This year must decide whether the industry is to tolerate and unconsciously foster the extravagant spirit of inflation that has characterized the past and brought the trade to its present pitiful state, or whether it will inaugurate new policies designed to insure the soundness of the business and to protect it from the ravages of piratical and destructive men and methods.

Less Money for Roads?

IN HIS first message to Congress President Harding disclosed what all hailed as a keen appreciation of the importance of highway development, when he said that "transportation over the highways is little less important" than that over the railways, and that the problems of construction and development deserve most earnest consideration "because we are laying a foundation for a long time to come." "The highways are not only feeders to the railroads and afford relief from their local burdens," he added, "they are actually lines of motor traffic in interstate commerce. They are the smaller arteries of the larger portion of our commerce. . . ."

He now proposes that the amount of money appropriated by Congress for federal aid to the states in road-building be reduced to $75,000,000, although he has said that "there is begun a new era in highway construction, the outlay for which runs far into hundreds of millions of dollars" and that "Congress has embarked upon a policy of assisting the states in highway improvement, wisely, I believe."

We sympathize most heartily with the general plan for reducing the government's expenditures, but we do not think it would be difficult to mention at least a dozen forms

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of governmental activity that could bear economy better than the work of providing the country with roads adequate to meet the demands placed upon them by an ever-increasing volume of traffic. The administration and the country at large should keep in view the necessity of increasing the amount of federal aid to the states rather than reducing it, since commerce is continually growing and is, therefore, continually calling for greater facilities for the movement of goods. Mr. MacDonald, chief of the government's Bureau of Public Roads, drew attention to this point, when he stated that the number of motor vehicles in the country (and, presumably, the volume of motor traffic) had grown during the last twelve years at more than six times the rate of highway construction.

Moock Leaves N. A. D. A.

After four years as general manager of the National Automobile Dealers' Association, Harry G. Moock has resigned to become the director of the department of merchandising with the Hudson Motor Car Company and the Essex Motors Company of Detroit. The department is newly created and Moock's work largely will be in assisting the Hudson-Essex dealers and distributers with their merchandising problems.

Mr. Moock has been in the automobile business ten years, five of which were spent as a dealer, automobile salesman and the remainder in association activity. He helped organize and became manager of the Rocky Mountain Automobile Trade Association, the first interstate automobile trade association in the United States. When the National organization was organized his record of accomplishment with the Rocky Mountain Association drew immediate attention to him as the logical head of the new national organization and he was placed in charge in 1918 when headquarters were opened in St. Louis. His record in association work is an outstanding feature of the great success of the National Automobile Dealers' Association. Its upbuilding has been largely due to his personal efforts and devotion to the highest principles and practices of fair treatment and consideration for every factor in the industry. A history of the dealer association will disclose that the record of accomplishment largely has been due to activities carried on under his leadership.

"I cannot adequately express the regret I feel at leaving the association," Mr. Moock stated in his resignation to the directors. "However, I feel that the pioneering work of the N. A. P. A. is over and that plans have now been put on foot which will be so readily adaptable to profiting the quality dealer that the association's success is assured."

Will Urge Fair Dealing

The motor industry has a direct obligation to the buying public and the efforts of the National Automobile Dealers' Association in 1922 will be to see that the dealers realize their part of the obligation, according to the plan of work for the year outlined by the members of the National Association at the fifth annual convention in Chicago which closed February 1. The association's future efforts will be directed toward strengthening the position of the solidly financed merchant who is conducting his dealer establishment upon the highest plane. The association adopted a code of ethics and fair trade practices which every dealer in the United States will be asked to live up to. Membership in the association will be dependent upon adherence to the fair trade practice. Only dealers who have been in business two years, who have a first-class credit and financial rating and a reputation for fair dealing with the public will be eligible for membership henceforth.

Thomas J. Hay, Chicago (Chandler), was elected president; William L. Hughson, San Francisco (Ford), first vice-president; John A. Butler, Kansas City (Dodge), second vice-president; F. W. A. Vesper, St. Louis (Buick), treasurer. New directors elected were R. H. Martin, Atlanta (Durant); George O. Wildhack, Indianapolis (Reo); P. H. Greer, Los Angeles (Maxwell-Chalmers-Hupmobile); G. G. G. Beckham, Cleveland (Buick); Ginder Abbott, New Orleans (Packard), and A. S. Eldridge, Seattle (Buick).

Approximately 2,000 dealers attended the Chicago convention.

Tire Merger Rumors Active

W. A. Johnston, president of the Rubber Products Company of Akron, has revived a plan for organizing a number of the smaller rubber companies into one large corporation. At a recent gathering of business men Mr. Johnston announced that the plan was under consideration, but said it was inadvisable to make definite statements.

The plan has been under discussion from time to time during the past two years. It was believed for a time that F. A. Seiberling, former president of the Goodyear Tire & Rubber Company, would incorporate a number of the smaller companies in his new organization. The purpose of the amalgamation would be to decrease overhead expense and make possible the meeting of the keen competition expected in the industry for the next few years.

New M. & A. M. A. Officers

Announcement has been made by M. L. Heminway, general manager of the Motor & Accessory Manufacturers' Association, of elections to the board of directors and committee appointments for 1922. The four directors whose term expired this year—E. P. Hammond, president, Germer Manufacturing Company, Detroit; C. E. Thompson, president, Steel Products Company, Cleveland; A. W. Copland, president, Detroit Gear & Machine Company, Detroit; and G. W. Yeoman, vice-president and treasurer, Continental Motors Corporation, Detroit—were all reëlected to the board.

The new board reëlected the same officers who served during 1921, as follows: President, E. H. Broadwell, vice-president, Fisk Rubber Company, Chicopee Falls, Massachusetts; first vice-president, W. O. Rutherford, vice-president, B. F. Goodrich Rubber Company, Akron, Ohio; second vice-president, A. W. Copland, president, Detroit Gear & Machine Company, Detroit; third vice-president, H. L. Horning, secretary and general manager, Waukesha Motor Company, Waukesha, Wisconsin; treasurer, L. M. Wainwright, president, Diamond Chain & Manufacturing Company, Indianapolis; secretary and assistant treasurer, G. Brewer Griffin, Westinghouse Electric & Manufacturing Company, Springfield, Massachusetts.

The other members of the board of directors besides the officers already enumerated are: C. H. Flintermann, vice-president, Detroit Pressed Steel Company, Detroit; F. Glover, vice-president and general manager, Timken-Detroit Axle Company, Detroit; J. M. McComb, vice-president, Crucible Steel Company of America, New York City.

Nash Promotes Voorhis

C. W. Nash has announced the promotion of Charles B. Voorhis to vice-president and director of sales of the Nash Motors Company and simultaneously Mr. Voorhis announces the appointment of Earl H. McCarty, formerly of the Studebaker Corporation, as sales manager. "The promotion of Mr. Voorhis to vice-president and director of sales," said Mr. Nash, "is well deserved and in the selection of Mr. McCarty I feel we have a man with the necessary qualifications and experience to shoulder the responsibilities of a position so important in this organization. Because of Mr. McCarty's long experience in merchandising we feel we are very fortunate indeed in having him with us."

Truck Tire Sales Mount

Truck tire sales are showing improvement. Increases for February range from 100 per cent. upward. Production in practically all factories is reported to be higher than a year ago.

The motor truck tire business was given a hard blow by the depression. While passenger-cars were generally operated regardless of general business conditions, trucks were laid up when no work for them was available. Gradually they are being brought out and placed in service. The increase in this line is expected to be slow during the next few months, however.

Gary Truck May Revive

The property and assets of the bankrupt Gary Motor Truck Company, Gary, Indiana, with assets of $407,846 and with liabilities equalling or surpassing that sum, were to have been sold to the highest bidder at public sale February 24. It is believed that Frank Dawson, president of the company, will head an organization to purchase the property and to continue under the old management.

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Opportunities in Hungary for American Motor Trucks

340 MACHINES IN USE IN BUDAPEST

The automobile manufacturing industry of Hungary is still in its infancy and has not been established in any degree bordering on large scale production, although increased interest in automotive transportation is apparent. The industry received its greatest stimulus soon after the start of the war, principally in the production of motor trucks for the Austro-Hungarian army. During the war privately-owned motor vehicles could be, and were, requisitioned by the government at any time, with the result that the purchase of vehicles by the civilian population became impracticable. It is also reported that a great number of cars were taken by the Bolsheviks during their regime in 1919.

During the eleven years from 1910 through 1920, the total number of motor vehicles manufactured in Austria was 2,504, of which 409 were passenger-cars and 2,095 were trucks. These machines were the output of six factories, all of which manufactured trucks, but only four of which made passenger-cars. One firm has not manufactured any vehicles since 1912; from 1915 through 1918 only one factory was making passenger-cars and four or five were producing trucks; in 1920 four factories were running, two manufacturing passenger-cars and two trucks.

It is believed that, were it not for the difficulty of importing raw materials, the Hungarian motor industry would be more successful in view of the fact that the low rate of the crown and the corresponding low rate of wages would permit the exportation of cars to nearby countries with favorable results. However, at the present time the factories are working on a reduced scale because of the further fact that the transportation situation is most unsatisfactory, and there appears to be a general slump in the motor vehicle market of Hungary.

The greater part of the motor vehicles used in Hungary are imported from other countries, and the business is carried on through the agents of foreign manufacturers. The first real influx of foreign motor vehicles began in 1905, due to the interest aroused by the Second International Motor Show held in Budapest during that year. Since that time the total importation of machines has been nearly four times as great as the entire domestic production. About 85 per cent. of the motor vehicles imported into Hungary, however, are never put into use in that country, but are re-exported to nearby countries. During the 11-year period from 1910 through 1920 the total number of foreign motor vehicles brought into Hungary and used in that country amounted to 784, of which 547 were passenger-cars, 59 motor trucks, and 178 motor-cycles.

As a guide to the number of motor vehicles in use in Hungary, some registration figures for Budapest, which contains the great majority of all automotive vehicles in the country, are given below:

Year.	Passenger-Cars.	Trucks.	Motor-Cycles.	Total.
1905	144	32	40	216
1910	581	89	45	715
1914	1,784	228	116	2,128
1917	1,811	259	147	2,217
1920	1,261	225	72	1,558
1921	1,998	340	146	2,484

The possibilities for the sale of motor trucks are especially worthy of consideration. Formerly motor transportation was used only when horses were not obtainable in sufficient number, or when quicker transport was desired or necessary. At the present time, owing to the fact that only about 37 per cent. of the horses existing in 1918 are within the borders of present Hungary, a great increase in the number of motor trucks is necessary to help restore the normal commercial traffic. The cost of transport of 1 ton of merchandise by 5-ton truck, with trailer attached, would amount to about 12 crowns per kilometer, as estimated by transportation men in Budapest. The rate for transporting the same weight of merchandise by rail, without allowances for cartage and transfer, is 19 crowns per kilometer by fast freight, according to the Transport Tariff of the Hungarian State Railways, in force since August, 1920, and a 100 per cent. increase in rail rates is expected to be put in effect some time during the early months of this year. Although the high value of the dollar in relation to the Hungarian crown makes the importation of American motor vehicles difficult at present, American designs and engines are well appreciated in the country, and should find a ready sale in Hungary, particularly the medium-priced class, as the exchange rate becomes more favorable.

Motor Wheel Detroit Office

Effective April 1, the Motor Wheel Corporation, Lansing, Michigan, will open a Detroit office with M. W. Taber, special representative, in charge. The office will be located in rooms 601-802 Capitol Theater Building, on Madison avenue. R. I. Miner, in charge of the Pressed Steel Division activities in Detroit, will also occupy this office.

Large Transport Firm in England

One large English road transport concern has just organized its winter services. Fifty 3-ton trucks have been put into commission along with 25 lighter and faster ones. This number is the start and will be added to as the passenger-carrying summer motor coaches are converted into freight carriers. With this service the south coast towns of England will be served and linked up with towns in the Midlands as far as Birmingham, Leicester and Nottingham. Freight will be collected in the afternoon and delivered the following morning according to schedule. When the fleet is increased the area of operations will be extended commensurately, the aim being to cover the entire United Kingdom. A large freight depot has been established, in one of the most accessible parts of London, which will act as a clearing house. The heavier trucks will operate on the longer routes, while the light ones will mostly be utilized for suburban and short deliveries. These services will mostly be run at night time.

Farm Truck Carries Proof to the Agriculturist's Gate

SURVIVES TRIALS OF 3,000-MILE TRIP

A narrow escape from being snowbound, almost being buried in a landslide, and constant danger of falling off precipitous cliffs during the night were a few of the thrills experienced by J. H. Blake of the International Motor Company who recently drove a Mack "year-round" farm truck through several states of the comparatively undeveloped West. The purpose of this trip was to demonstrate to the American farmer the ability of a motor truck to operate under the most unfavorable conditions and also to acquaint him with the advantages that can be derived from a motor truck which, through its flexibility and versatility, can greatly aid him to increase his scope of production and broaden his market radius. At the same time, the trip served particularly well as a test of the equipment in the interest of the engineers of the International Motor Company who designed the truck.

The truck started on its tour from Chicago and traveled westward, passing through the states of Illinois, Iowa, Minnesota, South Dakota, Wyoming, Montana and Idaho. Occasional halts were made to exhibit the truck at several state fairs and agricultural expositions where it was enthusiastically greeted by farmers from surrounding districts. Very little difficulty was experienced in traveling through Illinois, Iowa and Minnesota. Except for a few detours, the roads were generally good. But when the truck reached South Dakota many obstacles were encountered. Seven days of heavy rainfall had changed the dirt roads into mud—the famous gumbo mud of South Dakota, that is noted for its excessive sticking qualities, and through which it is hardly possible to drive a team and wagon. However, the truck forced its way through the mud, making headway slowly.

When crossing the Missouri River at Pierre, an incident occurred that brought into play all the farm truck's reserve power and revealed the truck's ability to operate under the most severe conditions. As there was no bridge at this point save that used by the railroad, the truck was compelled to cross the river on an old stern-wheel ferryboat. To board this boat, the truck had to descend a steep bank down to the shore as there were no docks at which to land. The ascent on the other side was rendered more difficult and hazardous on account of the soft soil which prevented the wheels of the truck from gaining proper traction. The rise was so abrupt that had the truck started to slide backward it would have meant a serious, if not fatal accident.

From Fort Pierre the farm truck proceeded southwest to the Custer Battlefield Highway. Due to the heavy rainfall, in some spots it was almost impossible to keep moving, and it was often necessary to cross ditches and drive through fields, or to let one side of the truck progress slowly through the soft mud at the fringe of the road. It was practically out of the ques-

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tion to keep all four wheels on the highway simultaneously.

The journey through the Black Hills was accomplished at night. On this part of the voyage the truck experienced some of the severest tests of the entire trip. In some places landslides had obstructed the road. It therefore became necessary, even though the truck at the time was pulling up a steep grade, to drive in quick jerks back and forth in order to pass through the soft shaly soil.

After a short stay at Billings, Montana, the truck continued southwest to Yellowstone National Park. Upon leaving Yellowstone Park, the truck was engulfed in a terrific snowstorm, and to escape being snowbound it had to travel throughout the night over treacherous roads, filled with potholes and ruts. In some instances it was driven for miles along the edge of deep canyons due to the many washouts that had completely obliterated the roadway. After driving through the Snake River Valley, stopping occasionally at small towns to give demonstrations, and having traversed the Black Desert, visiting its scattered settlements, the farm truck eventually arrived at Boise, Idaho, the end of the journey.

The truck had traveled an approximate distance of 3,000 miles, the most difficult part of which was through South Dakota, Wyoming, Montana and Idaho. This interval, which amounted to about 1,700 miles, was covered in 8 days and 9 nights—the average driving day being 19 hours, and a day's mileage from 80 to 300.

Previous to starting this trip the truck had been driven about 3,000 miles on demonstrations and tests of all kinds. No repairs were made before starting and none were necessary after finishing.

To End Used Car Difficulties

(*Continued from page* 11.)

9. It shall be the duty of the governing board to compile the weekly reports of used car sales and used car inventories.

11. In event the dealer has a trading allowance from the factory or is willing to cut his list price for reasons of his own, or desires quickly to sell certain models that may soon become obsolete, he shall at once advise the governing board the amount of the cut or allowance, though he need not explain his reasons. When such dealer handles trades, however, he shall quote only regular allowance figures, the object being to put everybody on an even basis and not give the public a wrong impression of the value of the used car.

12. When a customer purchases a new machine and decides within 60 days that he wants to purchase another from the same concern the dealer may make the exchange on any basis satisfactory to himself and the customer.

New West Wheel

The West Steel Casting Company, Cleveland, has developed a light express wheel for pneumatic-tired trucks. It is adapted to 34x5-inch tires and employs the demountable rim. It is of cast steel, weighs 37 pounds without tire and rim, and has its material so disposed as to give considerable lateral strength. The wheel is dished and has reinforcements at the hub and periphery. The outside appearance gives the impression of a solid spoke. This wheel has been adopted for a new high-speed truck made by a prominent Cleveland company.

New Truck Fees in Mississippi

A new truck tax bill introduced in the Mississippi Senate takes into consideration the carrying capacity and a 1-cent tax on every gallon gasolene sold by a retailer. Money raised from this tax is to be used for road funds for each county.

Electric vehicles are taxed $10 per year. Gasolene trucks are taxed from $6 to $175, according to capacity. These taxes are as follows:

For 1 -ton or less carrying capacity..	$ 6.00
For 1½-ton carrying capacity.....	9.00
For 2 -ton carrying capacity.....	18.00
For 2½-ton carrying capacity.....	22.00
For 3 -ton carrying capacity.....	35.00
For 3½-ton carrying capacity.....	50.00
For 4 -ton carrying capacity.....	70.00
For 4½-ton carrying capacity.....	100.00
For 5 -ton carrying capacity.....	125.00
For 6 -ton carrying capacity.....	175.00

More than 6-ton carrying capacity, per ton, $50.00 per annum, not to exceed $250.00 per annum.

On each motor vehicle 30 cents per horsepower, provided the minimum license fee shall not be less than $5.00.

Electric Vehicle Show

At a meeting of electric vehicle manufacturers and dealers held on February 7 plans for the Electric Automobile Show of 1922 were discussed. The invitation of the New York Edison Company to hold the exhibit in its Irving Place showroom was accepted and April 3 to 15 was decided upon as the time. A similar show was held a year ago and, judging by the interest of the manufacturers, the event will probably become an annual affair. As with the 1921 show the displays will be held in two parts. The first week will be devoted to street trucks and passenger-cars, while the second week will be given over to manufacturers of industrial trucks.

Truck Order from Poland

R. E. Taylor, representing the Service Motor Truck Company, has returned from Poland with a large contract with that government for trucks, tires, machinery, etc., to be supplied to the Polish War Department. Other Indiana companies that may receive part of the business of the truck order are the Midwest Engine Company, the Oakes Company of Indianapolis, the Pressed Steel Products Company, Michigan City; the Ross Gear & Tool Company, Lafayette; the Bimel Auto Wheel & Spoke Company, Portland; Muncie Malleable Iron Company, Muncie; the Muncie Foundry Company, Muncie, and the Fairmount Drop Forge Company, Fairmount.

Mason Will Make Truck

The Mason Motor Truck Company, headed by Arthur C. Mason as president and general manager, has been incorporated in Michigan with a capital of $500,000, and has acquired a plant in Flint for the manufacture of a 1-ton truck to be known as the Mason Road King. The secretary of the company is Melvin C. Day, who has been closely associated with Mr. Mason for eighteen years, and the treasurer is A. G. Bishop, a vice-president of the General Motors Corporation.

The truck will use a Continental engine and Timken axles. It will sell for around $1,000. The plant, which has been purchased in the south end of Flint, has a capacity of 40 a day, and the company expects to be running at capacity by midsummer. The new corporation is completely financed and no stock is on the market. Mr. Mason built the first motor used in the first Buick car. He organized in 1911 the Mason Motor Company of which he was president and general manager, and, when this company was taken into the Chevrolet company, became a consulting engineer for the General Motors Corporation, where he developed the Samson tractor.

New GMC Branches

A direct factory branch of the General Motors Truck Company has been opened in Atlanta for the distribution, sale and service of GMC trucks in the southeastern states. This branch will take the place of the Southeastern GMC Truck Company and will occupy the same building.

T. K. Johnson, for the last four years general manager of the Southeastern GMC Truck Company, has been appointed manager of the factory branch. In addition the company will take over the Charlotte, North Carolina, branch of the Southeastern company and will operate it also as a factory branch under the supervision of the branch in Atlanta.

New Truck Rates in Jersey

The New Jersey Senate has passed by a 13 to 7 vote the bill of Majority Leader White increasing fees for motor trucks of more than 13,000 pounds gross weight and capacity. The fees graduate from $55 for 13,000-pound trucks to $270 for trucks of 30,000 pounds.

Senator Parry said that there was considerable opposition in Essex to the bill and that the motor truck industry claimed such high fees would drive big trucks out of business.

'Bus Bill Offered

Senator Downing of New York has introduced in the state legislature a bill designed to give New York City unlimited authority to issue bonds for the purpose of motor buses. An initial expenditure of $25,000,000 for this purpose has been appropriated by the Board of Estimate and Apportionment.

City 'Buses "Without Consent"

Under a bill offered by Assemblyman Covillier, democrat, of New York, the New York City Board of Estimate would be authorized to establish motor 'bus routes in the city without the "consent of any board or body."

New Willys Motor Wagon

A. C. Barber, sales manager of the Willys-Overland Company, told a meeting of Overland dealers in Detroit that the company would produce within sixty days a new motor wagon chassis which will be marketed through all Willys dealers.

Recent registration data from British Honduras show 12 trucks in the colony. Three are in Belize, 5 in Corozal, and 4 in El Cayo. All are of American manufacture.

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The Erie Railroad Trucking Plan

By C. S. MOTT
Vice-President, General Motors Corporation

A NEW plan for the handling of freight in New York City, which promises to revolutionize the whole port system, is being put into effect by the Erie Railroad. The plan is designed to relieve congestion, to cut down the costs of delivery, to keep the freight moving faster than by the old system and to make possible direct delivery of freight to the consignees.

The Erie plan, many features of which are already in operation, calls for the opening of inland freight forwarding and receiving stations, the utilization of motor trucks for direct deliveries and the transfer of freight from the New Jersey terminals direct to the consignees in huge containers, made to fit on a motor truck chassis. Two of the inland freight forwarding and receiving stations were opened on January 3 and two more soon thereafter. Direct deliveries are already being made by means of motor trucks moving to New York by ferry. The container system, which is the last step in the modernization of the present scheme, will be in full operation within a few months.

The new system is the result of several years' study of the railroad problems in this port by J. J. Mantell, general superintendent of the Erie's lines east, at the direction of F. D. Underwood, the Erie president. Mr. Mantell, as federal terminal manager of the railroad terminals in the district embracing Greater New York and adjacent waters, organized the transportation facilities of the port to take care of the heavy movement of troops and supplies during the war.

President Underwood of the Erie Railroad, recognizing the disadvantages of the existing uneconomical conditions brought about by the expensive lighterage deliveries which had to be made in New York, reasoned that if the port served by his railroad was to compete with other ports along the Atlantic seaboard the terminal costs in New York, which consume a major portion of the operating expenses of hauling a carload of freight between Buffalo and New York, must come down and the cost to the merchant in New York must be reduced to compete with the other ports, where direct delivery of freight from car to steamer prevails. About the time President Underwood began to make his plans the war broke out and business received a temporary setback. Manifestly the time was not opportune to experiment with any new plans.

While Mr. Mantell was acting as the port director for the United States Railroad Administration during the war, he never lost sight of President Underwood's idea of solving the port problem, and with this thought uppermost in his mind he set about to make an exhaustive study of all phases of terminal operation, including switching, pier handling, lighterage costs, etc. The analysis involved a research of several thousand boat logs and many different operating reports which it was necessary to piece together to obtain basic costs. When the result of these examinations was apparent the railroads first began to realize what their costs really were for doing business in New York.

Upon the return of the railroads to private control on March 1, 1920, President Underwood directed Mr. Mantell, his New York manager, to continue to study the problem. With the knowledge gained while acting as director of the port and the additional study upon return of the roads, Mr. Mantell went at the problem in earnest.

In the development of the plan for the coördination of the trucking service with the railroad, Mr. Mantell has had the coöperation of ex-Governor Alfred E. Smith, chairman of the board of the United States Trucking Corporation. The waste in trucking has long been apparent not only to the business interests, but to any one who goes on downtown streets, where trucks loaded with from 5 to 7 tons may be seen slowly moving, with others carrying one or two boxes crawling behind them. In an effort to eliminate this tremendous trucking waste the Erie Railroad and the United States Trucking Corporation made an extensive experiment in trucking freight between Jersey City and all parts of Greater New York, charting out routes and running-cost sheets to make a comparison of trucking and lighterage operations. These experiments have resulted in the installation of the inland stations, which are to be increased in number as conditions require.

The methods adopted by the Erie mark a radical departure from the long-established methods of the trunk-line carriers serving the city in the handling of domestic freight. The innovation, according to persons who have studied its details, has already demonstrated that the old methods, which have existed for many years, must be discarded, if the city is to keep pace with the improvements planned for the port.

The transfer of freight on motor trucks by ferry has been carried on for some time. The plan involves the breaking of bulk of all domestic freight, except dairy products and perishables, at Jersey City for all points south of Fourteenth Street, Manhattan, and the transfer of such freight at the terminals to motor trucks, tractors and trailers. Three trailers are provided for each tractor, so as to take up all the slack in loading and unloading. Car-load freight, which constitutes about 60 per cent. of the inbound and outbound tonnage, is delivered to or received direct from the merchant's warehouse or store, at the option of the consignee, or he can obtain delivery of his freight at the inland stations.

The new arrangement, according to Erie officials, has already demonstrated that freight can be moved by ferry and delivered by truck more quickly than by the old system of car-float delivery, and that by this method direct delivery of freight, sought for many years, is now possible.

All the outbound freight, whether collected direct from the merchant or delivered through the inland station for forwarding, is consolidated at Jersey City into straight cars for various destinations on the Erie and its connections in the Northwest, Far West and South, obviating the rehandling of freight at transfer stations.

While this system of truck deliveries is limited at present to Manhattan Island, south of Fourteenth Street, the Erie Railroad, its officials say, has not lost sight of the needs of the Greater City which may be met through scientific utilization of the great waterways of the Port of New York and the employment of the modern motor truck.

The container system, which is the ultimate development planned, calls for the use of a centralized break-bulk transfer and containers of all-steel or steel-frame construction built to hold 12 or more tons of freight. The dimensions of the containers will be 17 feet 5 inches by 8 feet by 8 feet 5 inches.

Inbound freight under this plan will break bulk at the transfer, from which point distribution will be made for consignees desiring direct delivery and for inland stations where direct delivery is not requested. The containers, placed on flat cars, two to a car, when loaded, will move to the Erie's waterfront, Pier H, Jersey City, which is equipped with four 20-ton electric cranes and has a capacity of 125 cars or 250 tons at one setting. The containers will be moved from the flat cars on to car floats by means of electric cranes. The capacity of the cranes for handling containers is unlimited.

AS EACH car float is loaded with its cargo of containers, averaging 5 tons of less-than-car-load freight and from 10 to 12 tons of car-load freight per container, it will be towed to a centrally located pier in New York, where the freight will be lifted by mechanical cranes, placed on truck chassis and despatched to the inland stations or the consignee's door. The inland stations are to be equipped with lifting cranes to move the containers, and like facilities may be installed by consignees who receive a large volume of freight. Where the consignee has no crane facilities the container acts as a truck body and freight is unloaded from the truck.

The same plan will be used in handling outbound freight. With the development of the container system it is also planned to serve the short-haul New Jersey territory, embracing industrial cities such as Newark, Paterson, Passaic and other points in northern New Jersey, and as far west as Middletown and Port Jervis, with container cars without breaking bulk. This would eliminate the expense of rehandling—a heavy item in freight handling in and out of New York City. By the use of these

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methods a shipper in Paterson, New Jersey, could load a container car with car-load freight and the lading would move through to the consignee in New York without having been rehandled by the railroad company.

The economy to be effected by the operation of the container system, which takes up the slack time of trucks loading and unloading, avoids rehandling of freight and delay to the trucks in entering railroad piers, and allows a greater turnover per trucking unit, is apparent. If this scheme were applied on all the railroads, it was said, estimates are that one of the proposed piers would displace five or six of the old-type railroad piers, in view of the fact that the present railroad pier is so limited in car turnover that the average single railroad pier handles only 40 cars a day as compared with an estimated handling of 200 to 250 cars a day under the container system.

The extended system proposed is so elastic, it is said, that a container float with 60 or 120 containers can be sent to the Bronx, Harlem, Brooklyn or Staten Island. The saving in trucking expense can be estimated by a comparison of the cost of handling with the employment of cheap water facilities and movement by 60 to 100 trucks through the city streets. The employment of container-car floats and inland stations will allow making deliveries to particular consignees on not only car-load shipments, but less-than-carload shipments.

It is contended that the Erie system allows a wider distribution of facilities than other systems perpetuating the concentration of bulk delivery to lower Manhattan, and that it makes use of present railroad facilities and does not involve the scrapping of railroad property worth millions of dollars. Erie officials say that it is simply an extension of its transportation system into the heart of the city. Mr. Mantell is an enthusiastic advocate of the use of the motor truck as an adjunct to railroad terminal operation.

"It is being rapidly recognized by railroad officials that it is not necessary to build their industrial-serving tracks into the heart of the great business centers, with its attendant heavy expense, cost of elevation, municipal and state taxes and the enormous cost of real estate. The railroads can distribute freight more cheaply from outside centrally located distributing stations by heavy-duty motor trucks, using demountable bodies in some instances and tractors and trailers in others, depending upon the conditions existing in the particular industrial center." Mr. Mantell expressed the opinion that the container-car would come into general use in this country before many years.

The methods employed by the carriers before the inauguration of the Erie plan are the same that were employed in 1851, when the Erie Railroad was opened between New York City and the Great Lakes, Erie officials said. Under the old scheme cars of freight received in the break-up yard for delivery to the city are placed on car floats for the different pier freight-stations on the New York shore; car floats are towed to these stations and the freight is unloaded from the cars to the floors of the piers; upon receipt of notice of the arrival of the freight the consignee sends his truck to the pier, where the freight is picked up from the pier and loaded on the truck at his expense.

The warehouses, commission houses, factories, stores, etc., in New York City were built mostly south of Fourteenth Street, where the railroads had placed their pier stations. Since the opening of the roads the increase of business has increased the volume of trucking and the concentration of piers to a point where the question of congestion has become very serious. This congestion in the restricted freight receiving and forwarding limits has cut down the utility of the truck to a point where it is a very disquieting feature of the merchant's costs, and the expense arising from the delays which trucks have encountered in the streets and at the piers, waiting in line to deliver freight or to go on a pier to pick up a piece of freight, has entered into the high cost of living.

The railroads, in providing and maintaining pier station facilities, bear a tremendous expense, and can use only about one-half of the pier space because of the space required for driveways and standing spaces for the trucks.

Basic Factors That Determine the Corerct Oil

By E. F. HALLOCK
Engineer, Vacuum Oil Company

THE correct lubrication of a motor truck engine depends on the following three conditions, all within the control of the operator:

(1) The use of lubricating oil of the highest quality.

(2) The use of the correct grade of this high-quality oil to meet the engine operating conditions exactly.

(3) Proper precautions to maintain the quality of the lubricant while in service and to make adjustments to insure its delivery in exactly the correct quantities to the friction surfaces.

Failure of the operator to give the necessary attention to any one of these three conditions may result in:

(1) *Impaired Performance.*—The lubricant plays a vital part in insuring smooth, regular operation and the maintenance of power output at its maximum.

(2) *Increased Operating Costs.*—Repairs due to incorrect lubrication are frequent and costly. Also the use of the wrong oil, or the improper use of the correct oil, tends to increase fuel consumption, the number of forced stops and the rate of depreciation.

With so much dependent on the correct lubrication of the engine, it would be unwise to neglect the few simple precautions necessary to insure the very best results.

The choice of the correct oil for any particular engine is a matter for a competent engineer. It involves the following four basic lubrication factors affected by engine design—factors which require engineering experience to evaluate:

(1) *Engine Operating Temperature.*—This depends primarily on the service or "loading" of the engine. The steady, uninterrupted, almost-full-load work of the tractor engine determines high temperatures as contrasted with the intermittent, variable-load work encountered by the truck engine. The engine size, the capacity of the cooling system, and the fuel used are some of the other features of design which have a bearing on operating temperatures. As all oils tend to lose body or thin out under heat we are naturally influenced toward the use of heavier-bodied oils where operating temperatures run high.

(2) *Oil Distribution.*—The ability of the lubricating system to distribute the oil to all friction surfaces when the lubricant is chilled and thickened determines how fluid the correct oil must be. In other words, this feature of engine design is the limiting factor with respect to oil body. Some lubricating systems are adapted for perfect circulation of all oils from the heaviest-bodied to the lightest; others function best on oils of light or medium body. The correct oil is of such body as to be perfectly distributed through the system of lubrication provided at all atmospheric temperatures likely to be encountered in service.

(3) *Carbon Formation.*—Not all oils are equally clean-burning; nor are all engines equally "sensitive" to the baneful effects of carbon formation. The correct oil will be of such character as to minimize carbon formation and the troubles which result from such deposit.

(4) *Seal for Piston-Rings.*—The correct oil will be of ample body and correct character to seal the piston-rings against passage of the highly compressed gases on the compression and power strokes. Such sealing is essential to conserve power, increase fuel economy and forestall excessive dilution of the oil supply with fuel and contamination by water and other foreign substances.

Plainly, the subject is an intricate one—a subject with which the average operator is at a disadvantage. However, all the beneficial results accruing from the use of a lubricant which meets every condition outlined above with respect to the engine are open to the operator. To attain them he must adhere to the following rules implicitly:

(1) Buy only from refiners who specialize on quality lubricants.

(2) Use the grade of oil for the engine which is recommended by the engineers employed by the refiner to study the conditions under which his lubricants give maximum service. The operator can then be sure that the oil recommended meets his requirements with scientific exactness.

(3) Follow the recommendations made by these engineers for draining the oil supply, cleaning the oil screen and adjusting the lubricating system.

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Sight-Seeing in Tennessee

Seven motor 'buses owned and operated by the Chattanooga Sight-Seeing Company have made, and are still making, history for themselves in point of continuous service. During the month of October, 1916, the first two trucks of this fleet were purchased at Chattanooga for the purpose of transporting sight-seeing tourists to Lookout Mountain, Signal Mountain, Missionary Ridge, Fort Oglethorpe, and the Chickamauga Battle Fields. In the years to follow, as the flow of visitors to the site of General Braggs' headquarters maintained during his siege in the fall of 1863 steadily increased, additional transportation equipment was needed. Two 'buses were added in 1917, one in 1918, one in 1919, one in 1920, and the eighth and last was added on the fifth anniversary of the purchase of the first 'bus. The satisfactory service over this period of nearly five years received by the operators has been the forerunner of repeat orders.

The two larger 'buses making daily trips to Lookout Mountain cover round-trip distances of 20 miles. In the 5 miles from the foot to the top of this mountain an altitude of 1,700 feet above sea level is gained, the grade varying from 2 to 14 per cent. No accidents of any nature have occurred to the trucks on this run, and only for three or four days throughout the year, when extreme weather and road conditions will not permit, do the owners fail to make this trip.

The route to the Signal Mountain is probably the most trying that any of these 'buses experience. The round trip covers 25 miles, an altitude of 1,600 feet is gained in the 4 miles from base to top, and many dangerous curves are encountered. At many points the curves are so sharp that it is necessary to stop the 'buses, back up, and again start down hill. This is quite a novelty to many of the sight-seers and more or less anxiety is portrayed on their faces during the descent.

The company operates Garford machines.

Trucks Carry Road Slabs

Owing to the difficulty of procuring water and aggregates in the vicinity of a concrete highway under consideration in Wyoming, the idea of casting concrete slabs at Casper and transporting these to the job was conceived. The accomplishment of this idea was further facilitated by five miles of concrete pavement already installed upon the highway over which the slabs were to be transported. The slabs or units are 8 feet long by 9 feet wide and of a uniform thickness of 6 inches.

In moving the slabs two large iron hooks were inserted into the two pipes embedded in each side of each slab, and by means of small hand-jacks the slab was raised, placed on rollers, pushed to the edge of the platform and stacked in layers. Each slab was then lifted by a 3-ton chain-hoist, operated on 3-ton rollers set upon 10-inch I-beam trucks mounted on A-frames. In this manner they were placed on trucks, carried to the job, removed in the same manner and firmly bedded on a thoroughly compacted sub-grade covered with a 2-inch sand cushion.

Two Trucks Save Over $3,000 Annually

By W. S. MARCH

Purchasing Agent, Philadelphia Bag Company, Philadelphia

WE ARE the largest manufacturers of burlap, cotton, and paper bags in Philadelphia. Our trucking consists of hauling our raw materials from the freight stations, and delivering the finished product to the freight stations and our Philadelphia customers.

We formerly contracted for our hauling at a flat rate per 100 pounds, most of the work being done by horses. At first the rate was 5 cents per, then it was raised to 7 cents. Later on the city was zoned and three different rates were charged: 5, 7, and 10 cents.

This system finally became unsatisfactory because it was hard to get our hauling done at any price. When we most needed a team or truck we were least able to get one. This meant disappointing our customers, or getting our raw material so irregularly that it was difficult to keep our production flowing smoothly. We also had trouble with the drivers, who were unwilling to take our orders because they were paid by some one else.

All these difficulties induced us to try the experiment of owning our trucks. On November 12th, 1918, we purchased a 5-ton Selden. It worked so well that, in January, 1920, we added a 3½ ton truck of the same make.

The 3½ tonner is used largely on freight station work, though it makes local deliveries. It makes between 4 and 5 trips a day, hauling an average of 8,047 pounds to the trip, and averaging about 2 stops per trip. The freight stations are located at various distances from our plant, the maximum being 2½ miles. The truck's average daily mileage is about 30.

The 5-ton truck is used mainly for city delivery, so it naturally makes more stops per trip. Its average is about 10. On the other hand, it makes only slightly over 3 trips per day, with an average load of 10,389 pounds. Nearly every day it makes a trip to Frankfort, 8 miles distant. It averages about 25 miles a day.

During this period the costs were as follows:

	(299 Days) 3½-Ton.	(293 Days) 5-Ton.
Fixed charges	$1,349.74	$1,576.85
Variable charges	1,913.13	1,785.59
Driver's and helper's wages	2,843.58	2,862.74
Total	$6,106.45	$6,225.18
Per day	*$20.42	†21.25
Per ton	1.09	1.30
Per ton-mile	.34	.34

*30 miles. †25 miles.

These costs are very satisfactory, because we know from experience that each truck is saving us at least $1,500 a year over what it would cost us to hire the work done. In addition, it is a business asset to have trucks at our beck and call, so that we can give our customers prompt service. Also, the trucks have a certain advertising value which we should lose if we hired our hauling. Our experiment in owning trucks has proved so satisfactory that we would not consider handling our trucking in any other way.

Traffic Signals in England

Many British motor truck users are urging the adoption of standardized road signals for use both by the police who control the traffic and by drivers; these signals to be standardized throughout the country. At present the signals employed by the police in one city will differ materially from those employed by the controllers in another, so that a truck driver on a trip passing through both towns is often confused, and sometimes a prosecution results on the grounds that the driver has disobeyed the traffic signals.

Some London authorities have urged the adoption of mechanical road signals consisting of a semaphore in the road center operated by a controller from the sidewalk.

At the present time the traffic control police wear white gloves to distinguish their movements, and employ but three signals to drivers:

(1) Holding the arm vertically to stop traffic approaching the controller from in front.

(2) Holding the arm horizontally to stop traffic approaching the controller from behind.

(3) Waving the arm across the body in the direction in which traffic is to proceed.

Some truck drivers are very careless. The existing practice is to throw out the right arm for a right turn, the left for a left turn, and either hand for a stop. In some cases drivers fling out their right arms and then make a left turn, and *vice versa*. Obviously only ignorance and carelessness are responsible for such actions, and, though legislation is hardly necessary, some standardization of these signals both for police and drivers is very long overdue.

Tractors Invade Lumber Camps

The day of the horses is passing in the logging camps, for the cost records of the horse compared with the records of the tractor in log-hauling show that the power equipment cuts the cost of the work by as much as 70 per cent.

These figures are affirmed by practical woodsmen of the Paper Pulp Manufacturers' Association, which has substituted mechanical power to a large extent for animal hauling, because of the far greater economy of the former. The figures given by these operators apply equally well to lumber operations, for hauling problems are identical in both types of cutting.

In addition to the greater economy, tractors can be used under severe winter conditions where the use of horses would be impossible.

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Why Not a License Classification for the Cushion Tire?

By H. W. SLAUSON
Engineering Service Manager, Kelly-Springfield Tire Company

WHEN the Bureau of Public Roads of the United States Department of Agriculture conducted its tests on the comparative impact or road destructiveness created by various types of tires, a basis was created for establishing state legislative restrictions on truck sizes, speeds and loads, in accordance with the tire equipment employed. But because these tests showed the marked difference between the road destructive effect of solid and pneumatic tires, many state laws now differentiate only between these two types.

Much of this is doubtless the fault of the so-called proposed Uniform Motor Vehicle Law which takes into consideration only two types of truck tires—the pneumatic and the solid. Definitions of these tires are to the effect that a pneumatic tire is one dependent upon confined air for the support of its load; and that a solid tire is one *not* dependent upon confined air for the support of its load.

These state laws, therefore, entirely ignore one of the most important classifications of truck tires which, for want of a better name, is known as the cushion tire. Theoretically, a cushion tire is a tire not dependent upon confined air for the support of its load, but which possesses resiliency far in excess of that of the ordinary solid tire because of the use of properly placed displacement spaces into which the rubber (which is not compressible) may flow when subjected to pressure. This tire has long life, cannot puncture or blow out, costs about one-half as much as a pneumatic and is nearly as resilient.

The tests conducted by the Bureau of Public Roads indicate that a properly designed cushion tire possesses shock-absorbing ability more nearly approaching that of the pneumatic than that of the solid. A peculiarity of such a cushion tire is that the impact or hammer blow imparted by it to rough roads does not increase in proportion to increased speed, as is the case with the solid. In fact, some tests indicate that the actual impact of a certain cushion tire is less at higher speeds than at lower speeds, and that such tires can therefore actually be run at 18 miles an hour with less road destructiveness than at 14 or 15.

The accompanying chart indicates the comparative road destructiveness of solid, cushion and pneumatic tires employed on a fully loaded 2-ton truck, the top line showing the solid tire; the middle line, the cushion; and the bottom line, the pneumatic. It is this middle line, representing the field in which truck tire development has been greatest and in which the largest opportunities for usefulness lie, that has been ignored by the legislatures of many of our states in the provision of the motor vehicle law. Such laws state, in effect, that this cushion type of tire shall be classified as a solid, and that trucks using it shall be restricted in their activities as though they were equipped with solids which obviously and actually, by tests, create more road havoc.

It must be remembered, however, that these tests of the comparative road destructive effect of pneumatic, cushion and solid tires apply only to a hard-surfaced road which has already begun to deteriorate through the appearance of obstructions and depressions at least 2 inches in height. The road impact or hammer blow struck by a truck wheel when traveling over a smooth road is negligible, whether the wheel be equipped with pneumatic or with solid tires. Is it not unjust, therefore, on the part of certain state legislatures to penalize the use on trucks of the one type of tire which seems destined to replace the pneumatic tire for equipment on vehicles of 2-ton capacity and over.

Another feature of road destructiveness which has not been taken into consideration is the damage created in wet weather by chains which must be used on solid tires or on smooth-tread pneumatics. Many a cushion tire, by very virtue of the arrangement of its displacement space, possesses a remarkable non-skid ability which obviates the necessity for the use of chains except in the most unusual conditions of winter operation. On the basis of a year's operation, therefore, such tires would present considerably less road destructiveness than might others which, although possibly more resilient on a rough road so far as impact is concerned, nevertheless would require the use of chains more frequently than the other tire.

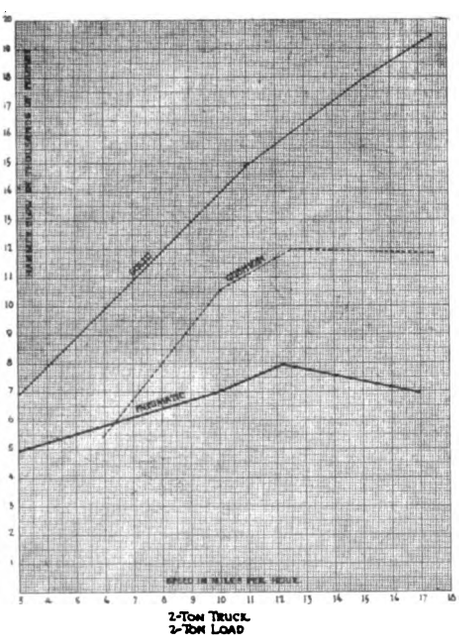

Chart showing the hammer blow (in thousands of pounds) given to a road by a loaded 2-ton truck traveling at various speeds (in miles per hour) and equipped with solid, cushion, and pneumatic tires.

Truck Taxes Hurt Farmer

"Under the existing tax law the farmer is getting hit in two directions at once," said C. C. Hanch, chairman of the Taxation Committee of the National Automobile Chamber of Commerce, at the meeting of the Committee on Agricultural Credit and Insurance of the National Agricultural Conference recently.

The special war-time taxes on particular industries, such as carpets, trunks, lighting fixtures, certain classes of dry-goods and motor vehicles, have unbalanced the normal relation of production and consumption, aggravating the upset condition of industry, and depressing the normal market for farm product.

In addition to this indirect harm the farmer suffers from a special charge on his particular form of transportation: the motor car and motor truck. The greater part of his travel is over the highways. Even on his way to a railroad journey he needs the motor vehicle to get him to the station.

More thrift in government, Mr. Hanch contended, would make it possible to remove the special burdens falling on a few industries which also pay the usual taxes levied on business in general. The removal of these abnormal penalties on few businesses will materially help to restore the economic balance and be a decided move toward business recovery.

"About three million motor vehicles are owned and operated by the farmers of the United States," said Mr. Hanch. "The excise tax levied against the motor vehicle is passed along and paid by those farmers whose operating costs are thus increased. Furthermore, the tax on the rubber and repair parts of the motor vehicle is a penalty charged to the misfortune of the owner, the only tax of its kind levied in the United States to-day.

"No one will deny the utility of the motor vehicle. In a word, it is simply transportation, and just as a charge against freight and passenger travel on the railway was a charge reflected directly in the loss of profits of every farmer in the country, so does the charge against the motor vehicle affect the farmer and in even larger proportion, since large quantities of his produce are carried on the highways which never reach the railways, while none may be said to go direct to the railway without traveling on the highway.

"The repeal of excise taxes on motor vehicles is just as essential as was the repeal of the tax on freight and passenger railroad transportation."

Egypt Wants Trucks and Trailers

In the early part of last year announcement was made that the municipality of Alexandria, Egypt, intended to purchase motor trucks and trailers. It is reported that, although the municipal finances do not permit of a purchase before 1922, and a tender at the present moment might be premature, the director general of the municipality states that he is interested in receiving catalogs and descriptive literature for trucks and trailers. Communications should be addressed to H. Hopkinson Pasha, Director General, Alexandria Municipality, Alexandria, Egypt.

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What Highway Traffic Surveys Show

By JOHN H. MULLEN
Chief Engineer, Minnesota Highway Department

THE study of highway traffic has been made necessary by the tremendous increase in the use of motor vehicles in this country. Within less than 15 years a complete revolution of highway transportation has taken place, changing within that period from horse-drawn to almost entirely motor-driven traffic. On account of the small percentage of horse-drawn vehicles we are now inclined to eliminate them from consideration as a governing factor in traffic studies, but as an obstacle to speed and consequently as a limitation on the volume which may be carried over a congested line this traffic is of importance and calls for thought on the part of highway engineers to provide some relief, such as slow traffic lanes along the sides of heavy traffic roads.

Most of the road pavements in this country have been built 16 to 18 feet wide and generally without shoulders adequate to carry a line of slow moving traffic. When one of these roads carrying a small number of horse-drawn vehicles acquires a traffic of over 1,500 vehicles per day there is congestion, decrease of speed and danger of collision on account of difficulty in passing. The decrease in horse-drawn as a percentage of the total traffic has been very rapid, but this does not mean that the volume of horse-drawn traffic has decreased in like proportion. On the contrary, on many main roads it has remained practically constant and in some instances has increased. As a typical example, on one of the main roads in Minnesota the average daily traffic count for the four past years shows the following number of horse-drawn vehicles in successive years, 17, 33, 35, and 38 per day, a reasonably constant number, while the same road for the same years showed motor vehicles to the number of 440, 501, 883 and 1,230 respectively. This situation would not exist on roads connecting contiguous industrial centers, but will be found to be fairly general in agricultural communities, particularly where farms are small and horses are required for other farm work. In other words, throughout the United States horse-drawn traffic will have to be reckoned with as a minor element in highway transportation for many years.

The remarkable increase in the number of motor vehicles in use in this country has brought many benefits. As a business proposition, the motor vehicle has increased the trade radius of the merchants and has made possible dairying and crops requiring quick marketing on great areas of land which would formerly be utilized only for grains and staple crops. It has also made possible the decentralization of smaller industries formerly confined to restricted districts on account of slow trucking, but which now are enabled to locate in suburban territory. It is predicted that with the improvement of roads this latter condition will be developed to an extent that will greatly improve the living conditions of industrial workers.

The motor vehicle is revolutionizing the social life of the country. Formerly the general travel radius on roads did not exceed 10 miles and the visiting radius in the rural districts was 2 or 3 miles. The trip to town was often a weekly affair taking a whole uncomfortable day. Rarely was there any visiting between towns or to different parts of the country excepting on railroad excursions. But with the advent of the motor vehicle the travel radius on highways has been greatly extended and is now limited only by the condition of the roads. We find in the lake regions of Minnesota during the summer cars from nearly every state in the union; the census at 137 stations in the state during 1921 showing an average daily traffic of 565 cars of which 59, or more than 10 per cent., were from other states. It is reasonable to assume that not less than another 25 per cent. were from other counties within the state, which, at an average of 3 people per car, meant at least 600 outside visitors per day passing each recording station. Practically every farmer now has an automobile and in the rural districts of the Middle West there are farmers' clubs in nearly every township, made possible by their ability to attend evening meetings without discomfort. The trip to town is now a relaxation of an hour or two and the farmer's family makes several drives a week to attend the "movies" or other diversions in neighboring towns.

One of the greatest benefits is through the consolidation of rural school districts made possible by motor transportation, which is giving to the farm children throughout the country the advantage of graded schools without having to move to the cities. All this is giving us a broader view of life and creating better general conditions, but at the same time is increasing traffic on the highways, which requires extensive programs of road construction and maintenance.

From such records as are obtainable, it appears that the increase in motor traffic is very nearly in the ratio of increase of motor vehicle registration. This increase in the United States follows a rapidly rising curve, starting at 48,000 vehicles in 1906, running to 500,000 in 1910 and 2,445,665 in 1915. From 1915 to 1920 the increase is practically uniform at the rate of about 1,300,000 vehicles per year, with a total registration January 1, 1920, of 7,565,446. During 1920 there was an increase of 1,666,495 vehicles, making a total registration on January 1, 1921, of 9,231,941. Registration for the first six months of 1921 is 9,245,195—which would indicate a considerable falling off in the ratio of increase of cars this year. This is to be expected, for it is estimated that the number of cars in proportion to population is approaching a reasonable maximum. In the United States there were 42 persons per car in 1915, 14 per car in 1919, and 11 persons per car in 1920. The 1920 figures range from a maximum of 31 persons per car in one of the southern states, to 5 and 6 in well developed agricultural sections, with 12 to 14 persons per car in the industrial sections where roads are practically all improved. It may safely be predicted that the number of automobiles will not exceed one to five people in the agricultural sections and one to ten people in the industrial sections of the country, even under the most prosperous conditions, with the probability that there may be a falling off in ratio during times of depression, for it must be admitted that prosperity has a considerable bearing upon the number of passenger-cars in the country.

Seasonal variation in traffic as shown by records would indicate that probably 25 or 35 per cent. of that on the main lines is regular and may be classed as business or necessary traffic. This traffic will continue to use the existing main lines and would not be diverted by improvement of parallel roads, but the balance, which may be classed as convenience or pleasure traffic, will in part seek other routes when the main lines become congested. This leads one to believe that a considerable portion of the traffic will be taken care of by parallel roads, and excepting for suburban roads and routes physically confined to one line between centers, the volume will not greatly increase on the present heavily traveled roads, but will be spread more uniformly over parallel routes.

COMMERCIAL traffic, including trucks and 'buses, presents the most difficult problem for solution by the highway official. This class of traffic has had a marvelous development within a very few years, but this development can not be accurately estimated for the reason that many of the states do not have a separate registration for trucks and traffic counts are scattering and not uniform enough for tabulation. It is estimated that there were approximately 988,000 trucks registered for the year 1920, or slightly over 10 per cent. of the total motor vehicles. It is evident from observation and traffic counts that trucks are confined more to cities and do not use the rural highways in proportion that automobiles do except in industrial sections, but it is also very evident that the ratio of increase in the number using the roads is greater than for automobiles. For example, traffic counts taken at the same stations on state roads in Minnesota show daily averages for 1917 of 463 automobiles and 8 trucks, while for 1921 the average is 1,099 automobiles and 72 trucks. Reduced to percentage the increase in automobiles is 235 per cent., while the increase in trucks is 900

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per cent. These figures are taken on roads which were not substantially changed as to surface and the increase is not due to paving or other influence than the development of trucking. Professor Blanchard is authority for the statement that practically the same situation exists in the eastern states, but of course in much greater volume, and cites hard-surfaced roads in Rhode Island upon which automobile traffic increased 102 per cent. in the past six years, while the truck traffic increased 659 per cent. The percentage of trucks to total traffic is also comparable in both cases, in Minnesota the increase being from 1¾ to 6½ per cent. in five years, and in Rhode Island from 3 to 15 per cent. in six years. An abstract from the traffic counts made throughout the country, indicates that practically the same ratio of increase prevails, and that the ratio of trucks to cars comes within the range of percentages above stated, which is an indication that we should figure the main arterial highways to carry truck traffic in the amount of about 10 per cent. of the total, running up to 20 per cent. or better on main arteries connecting centers within 50 miles of each other, and not less than 5 per cent. on what might be termed passenger trails.

OBSERVATION on the kinds of truck traffic are interesting and, contrary to the general impression, we find that the heavy truck is very much in minority and, with the usual exception of roads connecting neighboring cities, the 5-ton truck does not average more than 10 per cent. of the total truck traffic, while 75 per cent. of the trucks are of 2-ton and less capacity. It is to be expected that truck routes up to 50 miles in length will have an increasing number of 5-ton or larger trucks, but up to the present time and in the near future the bulk of the truck traffic is what may be termed express rather than freight and can be hauled more economically in the lighter trucks. Furthermore, one of the considerations in selecting truck service in preference to railroad service is speed and the convenience in the pick-up and distribution of loads, which are points in favor of the lighter truck. A bulletin was recently issued by the Department of Agriculture dealing with motor trucks on farms, in which it is stated that on a survey of 753 farms in the eastern states it is found that the farmers own trucks of all sizes ranging from one-half to 5-ton capacity, but that nearly half of the trucks used on farms are of the 1-ton size with only 3 per cent. of the owners recommending trucks of over 2-ton capacity. The same condition is found to exist in the Middle West, where farmers at a considerable distance from railroad stations are using trucks quite extensively and in practically all cases are selecting 2-ton trucks or smaller on pneumatic tires. The extent to which this traffic may grow is dependent almost entirely upon the improvement and systematic maintenance of roads, for a steady traffic of 20 trucks per day, regardless of weather conditions, is more injurious to an earth or gravel road than automobile traffic averaging 300 cars per day.

Commercial trucking of commodities outside cities has developed somewhat blindly and it is found that this service has not been generally profitable to the truck owner except where the entire length of the route traversed is hard-surfaced. As an example, a terminal truck service was established three years ago at the Twin Cities in Minnesota and in the second year 25 companies were operating through this agency over all kinds of roads. Of this number, 7 have discontinued business on account of poor sections of road on their routes, the remaining 18 companies are continuing to do business in a more or less profitable way dependent upon the proportion of good roads on the lines they cover. This service has been conducted practically the same as railroad service with regular tariff sheets for the various lines and with cargo insurance in all cases. An attempt was made to operate trucks on a time schedule, but this was found practically impossible on account of weather conditions and unfinished sections of road which prevented hauling at certain times. The interesting feature to engineers in analyzing this service is that the trucking companies find 2- and 3-ton units on pneumatic tires to be the economical size. A chart of the rates as compared with first class freight rates for less-than-carload lots and first-class express rates shows that the motor transportation rates, while about 100 per cent. above the freight rate, are only 50 per cent. of the express on the short haul, but for the longer haul the ratio of difference between freight and motor increases and between motor and express decreases, showing that the unrestricted use of public highways for commercial trucking works very much to the disadvantage of railroad express business for distances up to about 100 miles. For short-haul freight, when taking into account the terminal trucking, motor transportation will relieve the railroads of what they have always claimed to be an unprofitable business and this at a decreased cost to the public. In this connection it is interesting to note the reported statement of officials of a railroad company in New England that the railroad loses one million dollars a year in freight revenues on the shoe industry alone as a direct result of motor truck competition and that some of the small branch lines in the industrial sections of New England have been abandoned by reason of their inability to meet truck competition.

So far as traffic is concerned, motor 'bus service may be included as trucking, for most of the 'buses are 1½- and 2-ton high-speed trucks. This 'bus service is becoming quite general throughout the country and is conducted profitably during favorable weather at rates slightly less than railroad passenger rates. We find, however, that there is a decided falling off in the motor passenger business during bad weather and in winter. Continuous 'bus service is only established on long sections of surfaced roads, and with the paving or even gravel-ing of connecting lines of travel we may expect a substantial development of this traffic with its consequent effect upon the railroad passenger business.

It is very evident that, in fairness to the tax-paying public and the railroads, there must be a state supervision of commercial use of the highways, and that taxes on gross earnings should be imposed for this privilege, or at least that more equitable motor vehicle taxes be fixed for such use of the roads with all revenue made available for road purposes. It is only reasonable that commercial traffic should carry its share of road expense and that the state should prohibit the commercial hauling of passengers or commodities on public highways except by reasonable concerns bonded and supervised by the state.

As stated with reference to horse-drawn traffic, the volume which a given road may carry is governed very largely by the manner in which traffic is handled. Practically all state laws now prescribe a maximum speed limit of 25 miles per hour with no reference to minimum speed. Properly to handle traffic the maximum on heavy passenger lines should be increased to 40 miles per hour for certain hours of the day with a requirement that traffic must stop on the intersecting lines before crossing or entering the main line, and there should be a minimum speed limit on main lines of 25 miles per hour during these hours. It will be found that roads which now appear to be congested will very easily handle their traffic within these limits, and there is no reason why the minimum rate of speed should not be imposed for at least a 12-hour period from about 8 in the morning until the same hour in the evening. This will cause the slow heavy trucking to be handled during the night when there will not be interference on either side. This and other effective traffic regulations calls for a state system of traffic police, the value and efficiency of which has been well demonstrated in the State of Pennsylvania.

Highway engineers and most truck manufacturers are practically agreed upon an economical limit of weight of vehicles and wheel-loads for public highways. This is expressed in the proposed uniform traffic law adopted by the American Association of State Highway Officials and which has been incorporated in the highway laws of several of the states, but in all localities we find an occasional trucking company or truck manufacturer using excessively heavy vehicles. If this were allowed to continue, the public would be called upon for an unwarranted expense to rebuild roads destroyed by that small portion of traffic, and it is, therefore, extremely important that a uniform limit be established throughout all the states and this limit should be well within the maximum prescribed in the proposed traffic law.

IN MAKING a study of highway traffic one is impressed by the lack of definite comprehensive information on the subject and the conclusion is that in every highway department there should be an engineer assigned to traffic surveys. These surveys should be made in a somewhat uniform manner in all the states and the results compiled for the whole country by the Bureau of Public Roads. The highway departments are not organized primarily for the purpose of moving dirt and building pavements, but in performing their real function in the development of the country they are in fact great traffic departments designed to provide means of carrying the tremendous volume of highway transportation and to do this work porperly, the systematic study of highway traffic is essential.

The Simplex Manufacturing Company, body-builder of Conneautville, Pennsylvania, is in the hands of trustees to preserve the assets for the creditors.

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1921 Tire Output

Figures on the production of tires during 1921 (December data estimated) have been issued by the Rubber Association of America. They follow:

SOLID TIRES.

	Inventory.	Production.	Shipments.
January	303,753	21,220	29,116
February	304,374	23,365	29,599
March	283,800	28,710	43,926
April	269,985	28,859	42,080
May	264,633	35,156	40,122
June	240,336	28,395	49,867
July	220,003	35,123	55,678
August	216,367	55,694	66,866
September	161,332	37,441	50,276
October	163,299	46,274	45,911
November	173,451	43,537	34,556
December	169,000	40,000	40,000

CASINGS.

	Inventory.	Production.	Shipments.
January	5,319,605	703,430	965,417
February	5,193,018	819,892	1,073,756
March	4,597,103	1,163,314	1,614,651
April	4,527,445	1,651,418	1,785,951
May	4,451,668	2,100,917	2,085,882
June	4,154,456	2,313,265	2,643,850
July	3,892,037	2,570,524	2,757,581
August	3,934,853	3,043,187	2,894,442
September	3,340,798	1,929,268	2,047,929
October	3,545,030	1,928,271	1,675,169
November	3,908,342	1,756,555	1,342,519
December	3,697,000	1,840,000	1,980,000

TUBES.

	Inventory.	Production.	Shipments.
January	5,586,163	740,824	1,042,617
February	5,415,464	916,627	1,129,881
March	5,044,861	1,346,483	1,643,690
April	4,916,772	1,762,122	1,983,571
May	4,751,880	2,210,040	2,342,567
June	3,835,098	2,359,928	3,232,673
July	3,122,815	3,020,981	3,603,248
August	3,649,319	4,430,152	3,804,060
September	3,827,830	3,274,822	2,645,758
October	4,732,016	2,843,918	2,016,371
November	5,203,568	2,126,211	1,540,299
December	4,731,000	2,070,000	2,523,000

"Production" and "Shipment" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" include only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

G M C Surplus Plants

In readjusting its business to conform with new plans providing for still greater efficiency in production the General Motors Corporation has found it desirable to consolidate some of its manufacturing operations. As a result of this development, six plants formerly operated by the corporation are now being placed on the market. The number is small when viewed in relation to a business consisting of seventy-eight divisions, subsidiaries and affiliated companies. The plants offered are the old Cadillac plant, the Frigidaire plant, the Michigan Crankshaft plants, the International Arms plant, and one of the Champion ignition plants.

Motor Wheel Corporation

Operating profits of the Motor Wheel Corporation for the year ended December 31, 1921, were $599,590. The net income after deducting federal tax provision of $32,000 and inventory reduction of $266,249, was $301,340. After 8 per cent. dividends on the preferred stock there remained a balance of $112,772, equal to 25 cents a share earned on the 449,339 shares of $10 par. The previous report, covering the 10 months ended December 31, 1920, showed a surplus after preferred dividends equal to 57 cents a share on the common, after payment of preferred dividends. The surplus account stands at $2,081,775.

The Truck's Place in the Nation's Transport

By HENRY E. RIGGS

Professor of Civil Engineering, University of Michigan

WE have, as a nation, made serious errors in the development of our transportation systems in the past. The neglect of waterways, the lack of good judgment in building many lines of railroad, and the failure to recognize the value of the highways and to improve them, constitute blunders which have resulted in retarded development of large areas, great financial losses and the building of much useless railroad.

In the present phenomenal development of our highways, coincident with the great expansion of the automobile and motor truck business, we have an opportunity to retrieve past mistakes and to avoid new ones. May we not state the general transportation situation as follows:

1. Water transportation, not only along the coast and Great Lakes, but on such rivers as the Mississippi, Missouri, Ohio and many of the southern rivers, has undoubtedly a great future and should be developed far more than has been done in the past.

II. Railway transportation for long distance business and for all carload business where there is direct track connection to the factory or warehouse of the shipper is and always will be more economical than any form of highway traffic.

III. Highway transportation should be built up and encouraged as supplementary to railway and water transportation.

The motor truck is the inevitable solution of the railway's terminal problem. The most serious expense connected with rail transportation is the terminal expense. From warehouse or factory to cars and from cars to consumer, involving in the case of a large volume of the business two extra handlings of all goods and two short hauls, forms an expense item equal to the cost of hauling hundreds of miles by rail. We have no definite statistics on this subject. The railroad keeps no record of it. Too often the shipper and consumer keep none.

The motor truck and the automobile extend the zone of territory tributary to the railroads. With the improvement of roads radiating out from railway stations, the use of motors, either on regular routes, or privately owned by farmers and shippers, will place the man who is 20 miles away in as good position as was the man who under old conditions lived 4 or 5 miles away.

In metropolitan districts the motor truck has a great advantage over the railroad in quickness of delivery, and probably economy, on hauls of packages and less-than-carload freight on distances of 20 to 70 or 80 miles. Here the cost of motor transport has to compete with the cost of transfer at each end of the line, the extra handling and the cheaper per-ton-mile cost of the railroad.

The question of the establishment of lines of motor trucks in competition with railways is one calling for study. It must be clear that local business on a great through railroad from such cities at New York, Chicago, Philadelphia, Detroit or Cleveland to towns 20 to 40 miles away may get through occasionally in one to two days, but is more likely to be from four to six days between shipper and buyer, while with motor trucks it can be delivered the day it is shipped.

The problems here are what density of traffic will justify the service, and what is a fair rate. It is equally clear that between two small cities on one direct line of railroad, where the delivery depends wholly on the schedules of the local freight trains, delay on the railroad is reduced to a minimum, costs are smaller, and, unless there is an absolute guarantee of sufficient tonnage, competition should be avoided.

The following factors of the highway transport problem should be investigated:

(a) The cost per ton-mile of railway traffic.

(b) The cost of transfer and handling from shipper to railroad per ton.

(c) The cost of loading and transfer from railroad to consumer per ton.

(d) The cost of motor truck hauls per ton-mile.

(e) The difference in character and cost of packing for shipment by rail and by motor truck.

(f) The effect upon cost of motor transportation of different grades.

(g) The effect upon cost of motor transportation, loss of time, due to differences in character of roads.

(h) The effect upon railroad shipments in country districts of the introduction of the motor truck.

(i) In so far as possible to secure it, the effect upon the cost of maintenance of highways of the increasing use of the motor truck.

That the mileage of improved highway is to be vastly increased within the next five years is very certain. It is equally certain that motor trucks are not only here to stay, but that their use will increase many fold, and we must therefore build all our trunk-line highways to handle this traffic. We engineers argued to the farmer that good roads are an asset to him, as they reduce the cost of hauling his crops to market. We can not now fail to recognize that the motor truck as well as the road makes for the same result. Nor must the maker of the truck or its owner lose sight of the fact that the cost of building and maintaining the road is a part of the cost of transportation.

Japan imported $5,223,660 worth of motor vehicles in 1920, of which $5,015,130 worth came from the United States and the balance from Italy.

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Reducing the Number of Motor Accidents

New York Committee Considers Means by Which Highways Can Be Made Safe

PURSUANT to a joint resolution adopted April 16, 1921, a committee was appointed to investigate the subject of motor vehicle accidents in New York State. On behalf of the Senate, the president pro tem appointed the following members of the committee: Senators Seymour Lowman, James E. Towner and Nathan Straus, Jr.. On behalf of the Assembly, the speaker appointed Assemblymen George F. Wheelock, Harry B. Crowley, John A. Warren, Mitchell A. Traham, Jr., and Thomas J. McDonald.

Various public hearings were held by the committee, before which there appeared representatives of motor vehicle associations, motor vehicle manufacturers, representatives of bonding and insurance companies and many private citizens interested in the subjects under investigation. The startling fact was disclosed that during the year 1921, persons to the number of 1,981 were killed outright in the public highways of New York by motor vehicles, and that more than 40,000 were seriously injured in the same manner. The committee was unable to ascertain the property loss resulting from motor vehicle accidents as no definite reports were available, but its investigations convinced it that they amounted to several million dollars for the year.

Another astonishing fact brought to light was that the greater proportion of both deaths and accidents occurred outside the city of New York. This is due no doubt, to the very excellent handling of traffic by the police force of that city, while in the upstate communities no effort is made, except spasmodically, to enforce the traffic law or the motor vehicle law.

"New York State, with its 1,000,000 motor vehicles, to which must be added thousands of machines from other states, now operated on its public highways, presents a problem with which the legislature must deal," says the committee. "To conserve human life and protect property rights are fundamental functions of government and to that end we should direct ourselves."

Non-enforcement of the traffic law and the motor vehicle law is almost universal throughout the state, the committee finds. Conditions in cities are better than elsewhere. In most localities no effort at enforcement is made. The state has approached the subject almost entirely from the revenue producing point of view. The committee recommends a law providing for a motor vehicle commissioner with ample powers and a sufficient force of inspectors and examiners to enforce the laws. State police might well be used to assist in this work of conserving human life and property.

Careless, incompetent and irresponsible operators constitute a real menace to those who use the highways, says the committee and it recommends a state-wide operator's license, with the age limit not under 18 years. Outside the city of New York, there is practically no limitation as to who may drive a motor vehicle and it finds the child, the aged persons, the lame, the blind and deaf, dealing out death to those who use the roads. "Allow no one to operate a car without a license and provide for suspension and revocation, and carefully scrutinize all applications for licenses, and this trouble can be controlled," says the committee.

Speeding causes more loss of life than any other one thing in connection with motor vehicles. Fortunately the offenders themselves are usually the greatest sufferers. Suspension or revocation has been found to be the best method of dealing with this evil.

Overloading of trucks and then operating them at excessive speed renders these vehicles entirely beyond control. This practice is also destroying the highways, says the committee.

"All trucks should be limited as to load and speed. New York is far behind most other states in this matter. Careful inspection on the roads with heavy fines in cases of violations, would soon put a stop to this trouble."

"Defective or inadequate equipment is the direct cause of many accidents. The glaring headlights, improperly adjusted brakes and other defects, could be remedied by establishing testing stations on main roads, the same as is done in some other states. Our headlight law is a farce and should be brought down to date at once. Here again is shown the need of an enforcement official."

Financial irresponsibility of many owners and operators results in the unfair distribution of the economic waste caused by deaths, personal injuries and property damage from motor vehicle accidents, the committee finds.

This subject is the most complex and difficult of any the committee has attempted to deal with. Its correct solution is still a question of some doubt because of its far-reaching effect.

"Should the rule of law as to contributory negligence be modified so far as responsible owners are concerned, in the interest of society, which ultimately is called upon to bear the burden where responsible owners escape through lack of legal liability?" the committee asks. "How should we deal with owners who have no financial responsibility to respond in damages for injuries to persons and property through their negligence? Three methods have been suggested, all of which have warm advocates and none of which seem fully adequate to meet the situation alone:

"(1) Compulsory bonding by every motor vehicle owner as security to others.

"(2) Compulsory insurance against liability to others.

"(3) Compulsory compensation insurance to cover all cases of injury to persons or property."

The committee is still considering the last three propositions in the hope of finding some proper solution that can be incorporated into law.

Truck Market in Peru

The total of American motor trucks imported into Peru during the past seven years, including some 15 makes, amounts to 1,260. The number of trucks now in operation in the entire republic is estimated at 900.

American trucks of the lighter type enjoy increasing popularity, and the number of very light trucks in public use is growing rapidly. There are still many firms, especially in the metropolitan district, capable of purchasing and using motor trucks to advantage. An expected new highway this year between Lima and the port of Callao, a distance of 8 miles, will undoubtedly bring increased demand for trucks. The Marconi Company of London, now in control of the Peruvian postal system, has recently purchased three new De Dion Bouton trucks for transportation of mails between Lima and Callao.

The prices (converted at normal exchange) of leading foreign trucks sold in this market are:

	Price.
Caledon 5-ton (Scotch)	$7,115
De Dion Bouton 5 -ton (French)	7,790
De Dion Bouton 3½-ton (French)	6,650
Fiat 3½-ton (Italian)	6,318
Fiat 4½-ton (Italian)	5,832
Mercedes 5 -ton (German)	6,804
Mercedes 3½-ton (German)	5,832
Renault 3½-ton (French)	6,075

Construction of roads in the interior will stimulate the sale of trucks, but mainly of the light type, as the mountain roads are narrow. The provincial governments plan to purchase one or more motor trucks to be operated where roads are constructed to demonstrate to the Indians the benefits accruing from their labor.

Motor omnibus lines have recently been inaugurated in Lima. The Lima Omnibus Company (Compañia de Omnibus de Lima), operates three large De Dion Bouton cars, with a seating capacity of 35 passengers each, between Lima and the suburb of Magdalena, a distance of about 4 miles. Another line in Lima, the Lincoln Express. uses Ford 'buses.

'Bus Service in China

There are at present five American firms engaged in operating motor 'bus lines between Kalgan and Urga in China, and by spring it is expected that this number will be doubled. Hitherto only small motor cars, carrying four passengers and a driver, have been used in this service, and no attempt has been made to carry valuable freight. Aside from the question of carrying freight, the designing of a large machine for Mongolia is important, in that it will mean an increased passenger traffic, as the larger vehicles could easily carry from eight to fourteen passengers each trip. At least one American manufacturer has already made extensive investigations of the practicability of using trucks on this route, and considers the possibilities excellent.

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Insuring Continuous 'Bus Service

A Writer in "Motor Transport" Gives an Interesting Account of the Methods Practiced by the Largest 'Bus Concern in the World

SO accustomed have Londoners become to the almost monotonous regularity in the running of "General" 'buses on the routes served by them, that few pause to consider how it is that breakdowns occur so seldom, and how the mechanical condition and the general smart appearance of the vehicles are maintained. The problem presented certainly seems a gigantic one when it is remembered that the London General Omnibus Company is now operating about 3,000 "B," "K," and "S" type 'buses; and each of these is required to be completely overhauled at least once a year. It has for some time been generally known that the company was building at Chiswick a new factory at which would be centralized all repairing and overhauling of motor 'buses formerly carried out at between 30 and 40 L.G.O.G. garages situated in different parts of the metropolis. These new premises are now practically completed, and, in fact, repair operations there may be said to be in full swing, seeing that the output already amounts to no fewer than some 75 vehicles each week.

Before describing the various overhauling processes through which each L.G.O.C. 'bus passes at Chiswick, a few details of the factory will be of interest. Situated at Gunnersbury, alongside Chiswick High Road, the works site has an area of 31 acres, 300,000 square feet of which are occupied by the main building. The latter is of ferro-concrete construction, and divided into two main departments for the overhaul of body-work and chassis respectively, and a number of smaller sections, including the stores, experimental departments, boiler-house, garage, and first-aid station. The offices and mess-room occupy separate buildings, and in connection with the latter it may be mentioned that the main dining hall can feed 1,000 men at one sitting. As there are about 2,000 men employed in the works, two sittings would be necessary if all made use of the mess-room, but as a large number go home for their meals a larger hall is not required. Surrounding all the buildings is a cemented testing track dipping at one point to give down and up gradients of about 1 in 15. On leaving the assembling conveyer platform—to be referred to later—each 'bus chassis is tested on this track before having its body fitted; no testing is carried out on the roads outside the works.

Though the factory was designed to give a weekly output of 100 vehicles, if necessary as many as 120 machines could be reconditioned per week during short rush periods. If anyone should doubt the wisdom of the company's decision to devote a large amount of capital to an entirely new repair factory, it need only be pointed out that whereas 16 days was formerly considered the shortest period in which a 'bus could be efficiently overhauled, at Chiswick this time is reduced to 4 days. This means an aggregate saving of something like 36,000 vehicle working days during a year's operations.

To appreciate exactly how it has been possible to accelerate the reconditioning process to this extent it is necessary to make a fairly close study of the whole routine, from the time a 'bus enters the works to the time it leaves. To describe every repair operation in detail would occupy more space than is available at present, but a good idea of the thorough and scientific manner in which all the work is organized and carried out can be given.

The factory is rectangular in shape and is divided across its short dimension roughly in the middle by a partition which separates the body shop on the left from the chassis overhauling section at the right. Entering at the left corner of the rear side of the building, each complete vehicle has its body removed and then proceeds around the left end, the far side and the right end of the building, which it enters at the right corner of the near side. The body is mounted on an industrial truck and taken to the body repair shop, located in the left corner of the far side of the building, and accessible to the paint shop, the coachwork shop, electrician's quarters, etc. On entering the chassis overhauling section, the chassis progresses along the right end of the building toward the far side, its parts being removed in order (first, dashboards, radiators and hoods; then crank-shafts and crank-cases; then engines, clutches, steering-gears, transmissions, front axles, frames, and rear axles) and carried toward the left as work on them progresses, tires, wheels and springs continuing onward to the right corner of the far side of the building, where they are repaired and reassembled to form the beginning of the whole reassembly. This proceeds along the left end of the chassis overhauling section from the far side of the building toward the near side, the different parts being reassembled in the reverse order from that in which they were disassembled. The completely reassembled chassis leaves the building near the center of the near side and proceeds leftward to the point of beginning, where the rehabilitated body is mounted and the machine put in the garage adjoining.

THE administration of the factory is departmentalized by a chief engineer and operating manager, an engineer in charge, an experimental and research engineer, a superintendent of the coach factory, and a production engineer. There is a novel but simple and effective means of notifying heads of departments that they are wanted in the chief's office or on the telephone, in whatever part of the factory they happen to be. Placed high up at various points in the building are rows of electric lamps with globes of four or five different colors. Each officer is allotted one of these colors, and the lighting up of the lamps is under the control of the telephone switchboard operator, who can thus signal by illuminating all the red lamps, for example, that the engineer in charge is wanted instead of having to send a messenger for him. Another detail of the factory organization that is of interest effectively prevents pilfering from the men's coat pockets during working hours. All hats and coats are placed on special stands arranged so that they can be drawn up by cords to some ten feet above the ground; they are let down again when the signal is given to quit work.

THE first step of the reconditioning program is to separate the body of a 'bus from its chassis, so that each can be overhauled independently. In this connection considerable time is saved by the use of a special hydraulic jack. A 'bus is driven in under its own power and stopped with engine running between the two sets of lifting members of the jack. These are quickly adjusted, and, after the coach bolts have been removed, the jack is put in motion so that the body is raised, and the chassis is then free to be driven away to be dismantled. An electric industrial truck is then driven under the body, which is lowered on to its platform and conveyed to the coach-work section.

On entering the latter one notices first the preparation shop, where are made or repaired such items of the bodywork as staircases, top deck seats, hand-rails, etc., which are all standardized so that any can be used at a moment's notice for vehicles which require them.

In the coach section there is laid down a considerable plant of wood-working machinery, some of which is adapted to turn out complete in one operation certain members of the body framework that can be fitted into place without hand work being necessary. Here it may be mentioned that every part of the bodywork is carefully inspected, and no part is passed that is in any way defective. All advertisement boards and transfers are removed and replaced, destination and fare stages boards renewed, electric lamps and wiring overhauled, floorboards renovated, and seat cushions restuffed and recovered if necessary.

An important part of the reconditioning process necessarily lies in giving the vehicles a brand new appearance. Hand painting is adopted entirely for the bodywork, as there are four different finishing colors, and it has been found that the difficulty of satisfactorily covering up one portion while another is being painted renders the spraying method uneconomical in both time and labor. The whole process of painting one 'bus body normally occupies from 4 to 5 days, which is a remarkable feat when one considers the very high standard of finish every part receives.

The bodies are refitted to their chassis with

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the aid of a second hydraulic jack very similar to that used for their removal, and after they have been inspected, first to see that their equipment is complete, and secondly to insure Scotland Yard's approval, they are ready to leave the works to commence another year's mileage of about 30,000.

In the chassis overhauling section of the works there is opportunity and necessity for greater detail organization than in any other department, owing to the very large number of separate parts which require individual inspection, cleaning, repairing, and viewing before being reassembled. A carefully thought-out system has been adopted to insure that each process is carried out thoroughly under strict supervision, and in such manner that every component part is subject to treatment in the right sequence as it progresses towards the assembling platform, which is actually a constantly moving conveyer. The line of progress of the chassis as they are dismantled is parallel with, though opposite in direction to, that of the assembling platform, the intervening space being occupied by operators and machinery responsible for the actual overhauling. The parts are carried right across from the dismantling line to the assembling platform by slowly moving conveyers and rollways, and as the order in which the parts are dismantled is exactly the reverse of that in which they are reassembled they arrive at the moving platform just where required.

To facilitate inspection and repair, every part is thoroughly cleansed of oil, grease, and mud. For this purpose a series of tanks containing a hot solution of caustic soda is provided, and a number of cleaners are kept continually employed. Of particular interest, too, is the first of three special washing machines designed at the Chiswick factory. Briefly, this consists of a conveyer, which draws the parts to be cleansed through a "storm" of high-velocity jets of steam and hot caustic soda solution issuing from thousands of ⅛-inch holes drilled in a tunnel of coiled tubing. Aluminum parts are subjected to a special chemical treatment.

Limitation of space prevents us from describing how each component or part is given a new lease of life, but attention should be drawn to the special crank-case boring, reaming, and running-in machine designed in the works. It should be mentioned also that in the matter of machine dimensions a certain limit standard is maintained for all parts, so that all parts are interchangeable, and there is no need to see that any are reassembled after repair on the chassis from which they were taken. All cylinders are reground, valves trued up and ground in on special machines, all worn ball and roller-bearings renewed, radiators rectified when faulty, springs heat retreated and retempered, transmissions and steering assemblies thoroughly overhauled, magnetos tested and renovated in a special department, frames straightened if bent, new tires fitted, and, in fact, every part of the chassis is put into first-class order again.

Starting from bare frames the chassis, as they move slowly forward on the assembling conveyer platform, quickly assume a complete appearance, as all the erectors are practiced at their respective duties. When each reaches the end of the conveyer six gallons of gasolene is poured into the fuel tank (oil has already been put into the crank-case, gear-box, transmission and rear axle), the radiator filled with water, and the chassis in front is utilized to haul it forward until its rear wheels stop over two pairs of rotating rollers in the floor. This device enables the engine to be started up for the first time, when the chassis is in turn used to haul the next one to the starting-up position, and is then run out for its road test. "Tuning-up" is not completed until the 'buses reach their respective garages, where adjustments are made according to the routes served. It says much, for the efficient manner in which this "tuning-up" is done to be told that the average fuel consumption works out to 8 miles per gallon.

Finally, the chassis are driven into the paint shop, where they are spray-painted black before having the bodies fitted. A point worth mentioning here is that the bodies are painted when fitted to the chassis, so that such parts of the latter as dashboards and wings can be painted at the same time as the bodywork.

Fuel testing and analyzing form an important branch of the work carried out in the Experimental and Research Department, where also the chemical and other properties of lubricants are ascertained from time to time. In this department there is a test bench installation, a photographic darkroom, and other facilities which enable researches to be conducted thoroughly.

Borg & Beck Heat Indicator

Tractors and motor trucks are probably subjected to more severe driving conditions than any other piece of automotive apparatus. The excessive vibration of these vehicles often starts leaks in the cooling and oiling systems and their motors are often damaged from over-heating. Boiling away of the water under heavy pulling conditions in hot weather is an expensive occurrence. Whether working under extreme conditions in the summer or winter there is a certain satisfaction to the operators to know that his motor is at its efficient point of operation—neither too hot nor too cold.

The Borg & Beck Company has introduced a heat indicator for this purpose. The principle of operation is new. The device consists of three main parts, the actuating unit which clamps to the motor cylinder, a flexible shaft, and a gage.

The actuating unit contains a highly sensitive thermostat which is small in size, positive in action, and so constructed that any slight variation in the temperature of the motor will cause it to expand or contract in direct proportion. A gear segment and pinion are so connected to it that a turning motion is given to a flexible shaft attached to the pinion. The flexible shaft is of the dental type and forms a positive drive to the gage pointer.

The gage dial is of novel design, the temperature ranges being designated by contrasting colors. This enables the operator to read at a glance the condition of his motor.

The average driver is generally not aware of heating troubles until his motor begins to lose power and "knock." In many cases, scored cylinders, warped valves, etc., result from this abuse. Fan belts break, water connections leak, oiling systems fail and many other things might happen which would quickly damage the motor. These troubles invariably cause large repair bills and the laying up of the machine for indefinite periods.

Transport Factory Convention

In line with Transport Truck Company's merchandising policy for 1922, a most successful 3-day sales convention was recently held at the factory, Mount Pleasant, Michigan. Among those in attendance were: J. J. Eddy, eastern division; George I. Gargett, Michigan and Indiana; W. A. Neilson, southern division; C. W. Holmes, mid-western division; D. G. Westbrook, Pacific Coast division; G. M. Rockwell, southeastern division; Edward Taylor, Ohio and West Virginia.

The six models comprising the Transport 1922 line were inspected and analyzed. There was a discussion of the Transport Text Book, a comprehensive volume just completed which covers everything on Transport trucks and truck merchandising. The salesmen acquired much material for the intensive selling at hand.

C. V. Marshall, purchasing agent, dealt with market conditions and purchasing practice. Chief Engineer N. A. Wise explained Transport's mechanical features with blackboard drawings. Factory Manager F. W. Gargett talked on manufacturing methods and policies, with special emphasis on inspection. Advertising Manager F. L. Edman dealt with Transport advertising and sales promotion activities. Service Manager E. L. Meade spoke on the duties of the salesmen in relation to the service department. Sales Manager F. D. Engle presented ten points for a well-balanced selling talk on the Transport line. President and General Manager M. A. Holmes laid stress on the salesman's confidence in his own ability. Vice-president and Assistant General Manager H. E. Chatterton spoke optimistically of the future. He emphasized the financial stability of the Transport institution and the advantage it affords in the fight for business.

May Double Gasolene Mileage

Discovery of a tellurium gasolene compound, which increases motor vehicle mileage 100 per cent over the present gasolene fuel, was announced at the research laboratories of the General Motors Company in Dayton, Ohio, recently. The discovery was made some months ago by Thomas Midgley and Thomas A. Boyd, two chemists.

The annual supply of tellurium which has been regarded as waste matter at lead and copper refineries is only about 60 tons, according to the Chemical Society of America which recently made a survey. It was estimated it would require 1,500 tons to treat the annual consumption of gasolene. Mr. Boyd, however, said he believed this difficulty could be overcome.

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Standard Roads for Indiana

Uniform road construction is expected throughout Indiana as a result of an order issued by the state highway commission requiring the standardization of road plans and specifications for county highways which are subject to the approval of the commission. The regulation became effective July 1 and covers all county road projects submitted to the commission for approval.

The regulation is similar to the federal order requiring the use of standardized plans and specifications by the state for all roads for which government aid is expected. The action of the commission extends the use of the approved standards to the roads which will be built in Indiana under the provisions of the county unit road law, by which the state shares the cost.

Officials of the commission have compiled the standards for the Indiana roads, which are identical with the requirements made of the state by the federal government. The standards will apply to all county-aid projects proposed under the state highway law, the county unit road law, and the free gravel road law.

Many counties of the state already have adopted the commission standards voluntarily to keep their road construction up to the specifications prescribed by the federal and state engineers.

Members of the commision, in discussing the regulation, declared that it will have the effect of standardizing road construction throughout Indiana.

Truck Drives Stakes Quickly

The "big tops" are going up faster since the W. A. Plummer Manufacturing Company, of San Francisco, designed a special White truck body equipped with a power stake-driving device. Its efficiency in erecting tents may be judged from the fact that the power hammer will drive 5 tent stakes in the time it ordinarily takes 4 sledge-hammers to drive one.

The stake-driver gets its power directly from the main drive-shaft of the truck. The hammer operates in a cylinder of steel. By means of a friction clutch, which is engaged at will by the operator, the hammer is raised into striking position. Simply disengaging the clutch permits gravity to take care of the blow. It is geared fast enough to allow an experienced workman to strike 30 blows a minute with a force ranging from 300 to 1,000 pounds.

In addition to the stake-driving feature there is a vertical gypsy head, also connected to the main drive-shaft, which is used in connection with block-and-tackle in raising center and quarter poles of tents. This equipment enables the truck to handle the work formerly done by a team of horses that had to be picked up on the job.

There are various compartments on both sides of the truck for tools, stakes and the workmen's clothes. Two powerful searchlights, in addition to the truck's regular equipment, make it unnecessary to cease work on account of darkness.

"Whistle" Trucks Are Cheaper Than Horse Outfits

By WILLIAM FRIEDRICH

Manager, John Friedrich, Inc., Philadelphia

IT TAKES a fleet of 14 motor trucks to deliver the quantity of soft drinks that our customers demand. In addition to the 14 trucks, we are working 9 horses on the shorter hauls. So far we have not standardized on any particular make of truck but are trying out several. Two members of our fleet are 2-ton Garfords which have been running 10 months. These are fine looking trucks with closed cabs and large stake bodies on which we advertise "Whistle," one of our most popular soft drinks.

These two trucks deliver to retailers all over the city of Philadelphia, as well as in some of the nearby towns, such as Wayne, South Philadelphia, and Essington. Practically all the routes are over good roads. The trucks usually start out before 8 o'clock in the morning, carrying anywhere from 30 to 150 cases, containing 24 eight-ounce bottles each. The average load is around 100 cases. As a rule the trucks are out all day, and make about 35 delivery stops.

Due to the nature of our business, our trucking work varies considerably in volume with the weather. During the summer, when there is a great demand we employ helpers on all the trucks, but in the winter this is unnecessary. On some winter days there is not enough work to operate all our trucks.

The 2-tonners operate on deliveries about 230 days a year. In addition, they make 8 or 10 trips a year to freight stations after bottles and caps which come to us in carload lots. We get only six carloads a year, so the trucking required is relatively small.

As both machines are doing the same work, we have figured the cost on only one, truck No. 10, which has gone 5,322 miles in 10 months by hub-odometer reading. Since it has operated about 192 days, the average daily mileage is 27.7. This 2-ton truck costs $18.92 a day, 68.27 cents per mile, 18.95 cents per case, and 1.37 cents per case-mile. The half-time helper expense and the limited number of days operated make the daily cost appear somewhat high, though it is very satisfactory for this seasonal work.

It is difficult to make an exact comparison of the cost of doing this work with trucks and with horses, though we are convinced that the trucks are cheaper. Our difficulty is due to the fact that we have never employed teams on the long hauls made by the trucks. With horses our delivery range was very limited, but with trucks it is easy to make deliveries within a 12-mile radius. Horses were all right years ago, when the city covered a smaller area, but lately Philadelphia has spread out so much that it would be difficult to reach many of our present customers with horses.

We used to operate 24 horses, but now have only 9. We are absolutely certain that the use of motor trucks has increased our business range and decreased our delivery cost. That being so, we made no mistake in displacing horses for all except the very short hauls.

A summary of our cost records follows:

Operation.	
Days operated	192
Miles traveled	5,322
Miles per day	27.7
Miles per gallon of gasolene	4
Miles per gallon of oil	74
Itemized Cost.	
Driver and helper cost per day	$ 9.93
Depreciation per mile	.0823
Maintenance and repair:	
Actual, total	150.00
Actual, per mile	.0282
Estimated, per mile	.0470
Tire cost, actual, per mile	.0196
Average Cost.	
Cost per day (including driver, and helper ½ time)	$ 18.9211
Cost per mile	.6827
Total cost for period	3,638.24

Pennsylvania Builds Concrete Roads

The Pennsylvania State Highway Department has opened bids for the construction of about 60 miles of new concrete highways. On the 27 projects 220 contractors submitted bids. On one 4-mile project 17 bids were received. Another drew 16 bidders and a third 14 bidders. The total low bid approximated $3,200,000, or $53,333 a mile. Low bids submitted for 31.7 miles of 18-foot reinforced concrete pavement totaled $1,735,314, or $54,000 a mile, while on 21.7 miles of 16-foot reinforced concrete road the bids averaged $45,000 per mile.

The total highway mileage for Pennsylvania, as given in a recent classification presented to Congress by Thomas H. McDonald, chief of the United States Bureau of Public Roads, is 91,556 miles, of which 3,300 miles, or 3.6 per cent., constitutes the state highway system. The State Highway Department has available from different sources, $80,000,000 for the state system. At the rate of $54,000 a mile, should the department extend its policy of building 18-foot reinforced concrete to the entire mileage, it is estimated that the state highway system would cost $178,200,000. At the rate of $45,000 a mile for 16-foot reinforced concrete the 3,300 miles would cost $148,500,000.

The tendency is growing among highway engineers to reinforce concrete roadways with more and more steel or iron. The highest types of reinforced concrete roadway proposed for the "Ideal Section" of the Lincoln Highway will cost about $100,000 a mile.

Armleder Financial Condition

Total assets and liabilities of the O. Armleder Company, Cincinnati, Ohio, as of date December 31, 1921, are $1,065,467.91. Quick assets of the company are placed at $843,006.11 as compared with current liabilities of $60,755.43. Included among the company's quick assets are cash, $47,905.52, and inventory at market, December 31, 1921, $416,612.19. Real estate on the balance sheet totals $192,134.64, while other invested assets are $30,327.16.

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British Railways Try to Meet Truck Competition

By OBSERVER

THE sharp increase in the number of road haulage undertakings in Britain has forced the railroads to bring down their freight rates so as to be in a position to operate on a competitive basis. Already a reduction in parcel-carrying charges has been made by the railroad companies for parcels up to 11 pounds in weight. As a reply to this, several road transport concerns are organizing rapid services for London and its immediate envirous, say, up to about 15 miles radius from the heart of the city. Regarding the carriage of passengers the competition is just as keen. Says the secretary of the Commercial Motor Users' Association: "If the railways are going to do what they say (*i. e.*, cheaper fares and better trains), competition will be even keener next year. One thing which will have to be done, to my mind, is to put on the road a type of vehicle which will provide more comfort for the passenger. This year the most popular coaches have been those accommodating 24 to 28 people; I look forward to popularizing of a smaller vehicle, say the 20-seater. Then, too, the speed limit will have to be increased. This is actually being done. The speed of the larger motor coaches next season will be 16 miles per hour, instead of 12, and smaller coaches will be able to go up to 20 miles per hour. One point which we are seriously considering is the adoption of giant pneumatic tires; but it is also necessary that the roads should be improved. We hope that the big taxes we pay, which amount from the commercial side to over $25,000,000.00 a year, and which are all going to be devoted to the roads, will be spent, and that in 1922 there will be a great improvement. We shall have to keep pegging away at the Ministry of Transportation and the local authorities. What we want them to do is to round off the road corners, and in places where it is impossible for two motor coaches to pass to put in bags. This can be done inexpensively, and would save a lot of criticism which at present comes from the motor coach owners."

The opinion generally held by the railway companies is expressed by one of their executives. Says he: "We can not say that we have any definite plans yet to meet the new situation that has arisen. Beyond running good services of trains at convenient hours, and meeting the public as regards rates, etc., as far as working expenses will permit, nothing definite can yet be undertaken. It is important to remember, however, that, as far as most of the companies are concerned, a great deal of revenue comes from purely suburban traffic, and this would not be affected to any extent by an occasional motor service.

"Then as regards the motor trucks and the conveyance of freight, the big motor trucks are usually too large to get about London streets conveniently, and to back into the side streets and depots to load or unload freight at the various warehouses. There is always a dividing line where the road transport begins to become a serious competitive factor. As to truck traffic I do not exactly see how we can stop its encroachments, but we are cutting down parcels rates as a step towards getting back some of the traffic. In any case, the relative quantity of goods that can be hauled over the roads as compared with the railways must be limited at any time. A continuous flow of heavy road vehicles would entail such a cost for the up-keep of the roads as would lead to heavier taxation, which must, in turn, advance the freight charges of the road vehicles to a prohibitive extent."

It is most probable that the near future will see a reduction in railroad freightage for raw materials, such as iron ore, coal, steel, pig-iron and limestone. This is as a result of a conference of managers to consider the whole question of rates and competition.

On the other side, the road transport organizations are getting together with a view to linking up all the road transport companies in Britain, so as to cover every town and village in the country. During 1920 alone, when transport of freight by road was only just awakening in Britain, the railroads estimate that they lost 6,000,000 tons of freight which was captured by the road concerns, and the reduction in rates is the first step towards regaining the lost traffic. The road transport reply is lower vehicle operation costs, including labor, and better organization throughout the country. It is thought that the railroads will endeavor to regularize their use of road transport in Parliament next session when the big fight will come.

The general opinion amongst British business men is admirably summed up in *The Commercial Motor*. Says this journal: "It is an old and true saying that 'the King's highway' is open to all (more or less, in these days of taxation), but it is both logical and reasonable that its use by parties who enjoy monopolies of their roads should be conditioned by appropriate limits and safeguards in the public interests. We are satisfied that, with the case sufficiently well stated and examined, no House of Commons will establish a railway dictatorship by sanctioning general road transport powers for railway companies.

"The fight is far from its finish, and the fact that principles are at stake presages a prolonged struggle on the issue joined, before a final legislative decision can be recorded. The railway protagonists appear to be confusing the public mind by talking and writing of their exclusion from the roads, whereas it is not exclusion that is sought by those who champion independent road transport, but confinement to legitimate spheres. Let the railways benefit, we say, by the modernizing of their local cartage by horses to local cartage by motors, but only in respect of freight (and passengers) to or from a railway station for or after, respectively, conveyance by rail. Anything beyond that is outside the statutory and equitable limitations of traffic incidental to or consequential upon railway service. The rest belongs properly to road haulers, of whom there are plenty to guarantee competition.

Commerce Has Char-a-bancs Model

An American char-a-bancs for interurban 'bus lines has been developed by Commerce Motor Car Company of Detroit and is now ready for the market. This vehicle, which is neither motor 'bus nor truck, seats 10 passengers and driver comfortably, yet has the appearance and speed of a passenger-car.

A special touring-car body having 4 extra wide lateral seats is mounted on a heavy passenger-car chassis having 127-inch wheelbase. The engine is a 4-cylinder 3¾-inch by 5-inch Continental rated at 34 horsepower and drives direct on third speed, a fourth speed forward being furnished for use on pavements and level road. The makers claim this arrangement will give all the power needed and permit operation of the engine at 1,500 revolutions during 90 per cent. of the mileage covered.

W. E. Parker, president of company, declares that this car can be operated at a total cost of 13 cents a mile, allowing for all costs, depreciation and charges, including drivers' wages. With average passenger rates of 3 cents a mile, a daily mileage of 150 miles and an average passenger list of 8, he figures an operator should take in $36 a day and costs should average $19.50 a day, leaving a net daily profit of $16.50 or about $5,000 a year on an investment of $1,762.50 present cost.

At present a 'bus line operating touring-cars between Detroit and Grand Rapids is declared to be averaging one trip a day a car, or 152 miles, at a total cost of $15 per day, or 10 cents a mile. This company is using 7-passenger touring-cars which cost the same as a char-a-bancs and seat 6 pay-passengers instead of 10 in the char-a-bancs. Thus the investment per pay-passenger in the touring-car is $293 against $176.25.

The earnings of the touring-car are based on an average passenger list of 4, making gross income for 150 miles a day at 3 cents a mile about $18. Deducting operating expenses, depreciation, drivers' wage and all charges, totaling 10 cents a mile, or $15 a day, the net return on the investment is $3 a day, or about $1,000 a year against an estimated return of $5,000 from an investment of the same sum, $1,762.50, in a char-a-bancs.

The makers claim interurban motor 'bus patrons demand a vehicle with lateral seats which does not ride like a truck and that this car, fashioned after a French model, fills the gap between high passenger-mile touring-car cost and the 'buses built on truck chassis.

Imports of motor vehicles into the Dominican Republic during 1920 were valued at $438,153. In 1919 they amounted to $162,901.

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Trucks the Allies of Railroads

By A. J. BROUSSEAU
President, International Motor Company

IT is only within five or six years that the motor truck has been an important element in transportation. It owes its present important position in transportation to the railroads, which were unable to handle the enormous volume of freight traffic moving during the boom period of 1917 and 1920. When the railroads become congested and declared embargoes and were blockaded for weeks at a time, manufacturers were faced with the alternative of shutting down for want of raw material and supplies or finding another means of transportation. They turned to the motor truck as a temporary substitute. It served them so well that they have continued to use it since the railroads have succeeded in clearing up the traffic jam after the present business depression developed a year ago. Merchants and farmers were also compelled to use the motor truck to move their merchandise and foodstuffs, and they also have continued to avail themselves of motor truck transportation over the highway.

If you ask the question, "Did motor truck transportation over the highways help the railroads during the busy war years?" I am sure the answer will be "Yes." Without the motor truck transportation would have broken down utterly. Many industries would have been seriously embarrassed, and the country would have faced the possibility of hunger. No one who is at all well informed regarding traffic conditions during 1917-1920 will deny this. On the contrary, they will agree that the motor truck was a great help to the railroads during this period. It served the public also.

Business has been poor for the last year and the railroads can now handle all the traffic that offers. We are asked if the railroads are now helped by the motor truck. My answer is "Yes", for business is going to be good in the near future, and when it is the railroads will again be unable to handle the traffic. We shall then have delayed shipments, embargoes, blockades, and the truck will again save the situation for the railroads and for the public. It may also save the railroads from the fate they so narrowly escaped during the last traffic jam —permanent government ownership. If the motor truck is eliminated now and is not available when the next boom is upon us, the railroads will "fall down" so hard that government ownership advocates will have an excellent argument to prove that the government should take over the railroads. If it saves us from government ownership of the railroads, the motor truck will again have justified itself.

In addition to the service the motor truck renders to the railroads and the public during times of stress, such as I have described, it is an aid at all times to an even greater degree, as I will proceed to explain. Motor truck highway transport is the most efficient agency for moving l.c.l. package freight for distances up to approximately 50 miles. The reason for this is that in all large cities terminal charges are very high and amount to more than the railroad rate for short distances.

Edward Hungerford, an authority on rail freight transportation, asserts that "old time railroads for years past have said that a freight-car did not begin to make money until it had hauled its goods at least 40 miles; to-day the modern generation of operators will come nearer to putting this figure at 80 miles. Up to a distance between these figures—and undoubtedly far nearer 80 than 40—the vast terminal charges of the American railroad nullify the profit of the haul itself. This is a principle of rail transportation so well understood by all competent authorities to-day as to be open to no dispute whatever."

The short-haul traffic of the railroads has not been and is not to-day profitable. The railroad executives themselves acknowledge it. I have only to quote the prophetic words of Elisha Lee, vice-president of the Pennsylvania system, to substantiate this: "To the extent to which motor vehicles are likely to take over the short-haul freight traffic the railroads will probably be immediately benefitted financially, because short-haul business is becoming increasingly unremunerative on account of the high proportion of terminal costs which it must sustain."

THE motor truck aids the railroads in still another way. Several years ago James J. Hill got front-page publicity by the statement that the railroads needed $1,000,000,000 a year for terminal facilities. I understand that all well-informed railroad men will admit that the greatest problem they have to-day is inadequate terminal facilities.

I do not know the exact proportion of the existing terminal facilities needed to handle l.c.l. package freight moving less than 50 miles, but we are all sure that it is a very considerable part of the whole. It may be one-half, or one-quarter, but whatever it is, it should not be devoted to the handling of the non-profitable l.c.l. package freight that can best be moved by motor trucks. And again, if the railroads were relieved of this non-profitable l.c.l. package freight, the terminal would then be ample to handle the long-distance freight. The railroads would not need $1,000,000,000 a year for additional terminal facilities and would have enough equipment to move all long-distance freight, even during boom times. That is the answer to the question, "Is Highway Transport an Aid to the Railroads?"

We all agree that the motor truck has a place in the transportation scheme. Even the railroads admit it, if we accept their idea of the economic radius within which it should operate. Why not permit the shipper, the farmer, the public, to decide the economic radius—whether it be 50 miles or 100 miles—or more. As a matter of fact, the public, and not the motor truck owner, or the railroad will decide how far highway transportation may be developed.

AS THE matter stands the public is supporting over 600 motor express lines operating for varying distances up to 150 miles. Many shippers have used motor truck highway transport in moving l.c.l. package freight from New York City to points in Connecticut, southern New York, New Jersey and Pennsylvania. They know the advantages of over-night door-to-door delivery. They and their customers can testify as to whether the motor truck has a place in the transportation scheme. I will quote from an address delivered by a traffic expert, W. J. L. Banham.

"Users of motor trucks should consider to what extent they can be operated in co-operation with railroads for short-haul freight movement. The principles involved are: First, service; second, cost.

"There seems to be no question at the present time that the carrying of less-than-carload shipments to short-haul points by the rail carriers is not only expensive to the shippers, but is also unprofitable to the carriers. Until recently it seemed to be almost necessary for the shippers to use the rail carriers for the movement of their less-than-carload shipments to near-by points, regardless of expense and delay, as there did not seem to be any organized effort made by the motor truck operators to take care of this freight.

"It is extremely difficult for carriers to figure the cost of transportation of package freight hauled short distances and particularly to points at which they do not have a through-car movement. The expense of transferring the less-than-carload shipments one or more times when moving within 50 miles of the receiving station, and the additional expense caused by the delay of equipment, has been recognized by the government, with the result that the U. S. Railroad Administration during the war ruled that freight destined within a certain radius would not be handled by the rail carriers. It was necessary, therefore, for the shippers to find other means for transporting this class of freight. Motor truck transportation, while still in its infancy at the present time, pointed a way to the shippers whereby their less-than-carload shipments could be handled not only more promptly, but as a considerable saving both to the shipper and to the receiver of freight alike.

"While it is true that it is almost impossible for the carriers to figure the exact cost of handling short-haul freight, it is equally difficult for the shippers to ascertain the cost of transporting similar freight.

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The question of cost brings me to the first part of my subject, and in order to make it clear as to what I mean by costs and what these costs cover, I am going to refer to them as transportation costs.

"Transportation costs do not necessarily mean less-than-carload freight rates and motor truck rates, although both rates are a part of the transportation costs. What I understand to be a true transportation cost is all expense involved in making a shipment, starting with the boxing, or packing expense, together with handling expense in the shipping department, the loading of freight on teams for delivery to the freight-house, teaming charges from the shipping department to the local freight-house, and additional labor incidental thereto. To this must be added the less-than-carload freight rate and additional charge for cartage at the delivery point, with such other expenses as may be caused by requests for tracing, duplication of shipments lost or damaged in transit, entering of claims, checking of freight bills, delay to shipments in transit, and the expense of carrying additional stock to take care of freight in transit when moving via rail carriers. All these costs are properly transportation costs, and are a part of the shipping expenses which are paid either by the shipper or receiver."

The advantages of motor truck highway transport are not confined to the New York district. The motor truck is as much a part of the transportation scheme in New England, in the industrial Middle West, and on the Pacific Coast, as it is in the East. The farmers who own 150,000 motor trucks, and transport approximately 150,000,000 tons of freight a year with them, receive perhaps the greatest direct benefit of any user of motor trucks. With the farmer, in a great many instances, it is not a case of reducing his transportation cost, but of saving the entire value of his crop.

I have told how, without co-operation, the motor truck can, and does, help the railroads, how the motor truck reduces the cost of transportation to the public, but the half is not told. If the motor truck and the railroad will co-operate by working together, they will not only help one another, but will help the public to an even greater extent. Gerrit Fort, vice-president of the Boston & Maine Railroad, says, 'What railroad men should study is the best way to co-ordinate their own facilities with those afforded by this new factor in the field of transportation."

THE railroads entering Cincinnati have recently worked out a plan of exchanging freight by means of motor trucks. Great gains have been made in the way of releasing cars for main-line service, relieving the terminals of congestion, expediting the movement of freight, cutting the cost of handling nearly one-half. I have no doubt that the railroads will generally use the motor truck when it can be shown that such gains are possible, and that the savings, because of lower operating costs, will be passed on to the public in the shape of lower freight rates.

The New York Central lines have recently come forward with another installation of a slightly different type, the railway container-car. The car is a 9-section express car; its sectional cargo space consists of 9 separate containers, which are firmly locked during transit to avoid shifting. Each container, with an average capacity of 6,000 pounds, is removable, so that it may be carried by motor truck direct to the door of the consignee. When one further considers that a certain percentage of all package freight shipped by rail and express is tampered with, the importance of having these container units built of substantial steel, which can be unlocked and locked only on the premises of shippers, is apparent at once. It is generally expected among conservative critics that the railway container-car system will eventually mean another great step in the complete co-ordination in this country of the railways and highways.

I believe all will agree with me that the next great development in transportation in this country will be a national delivery service for picking up traffic at the point of origin and making delivery at the store-door of the consignee, at the point of destination. The motor truck offers the best solution of this problem in the opinion of many railway officials. Only recently the Erie Railroad in the interest of saving transportation charges and solving the water front congestion problem inaugurated the transportation of freight between the New Jersey rail terminals and New York City by means of trucks. According to J. J. Mantel, manager of the Erie lines in New York, this system which was instituted with a fleet of 68 trucks and two inland receiving stations in Manhattan, will be gradually developed into larger proportions.

President Harding said, just before he took office, "We must foster the use of motor trucks and build urban terminals for truck service to make new ties between communities and between city consumption and country production." This movement is already in progress in many of the larger terminal centers, like New York, Rochester, Buffalo, St. Paul, Los Angeles, and other cities. Radiating from these terminals is a vast network of intercity motor express lines. It is my understanding that there are over a score of such organized companies in Greater New York. Service is the fundamental characteristic of such operations and shippers in general appear to be glad to pay for it.

In the opinion of E. E. La Schum, general superintendent of motor vehicle equipment, American Railway Express, "the maximum daily horse mileages in heavy and medium heavy haulage are 20 and 24, respectively. The average is not much more than half this—12 and 14 miles. A motor truck can cover from 30 to 100 miles a day readily, although it is seldom as low as 30, and not often above 60; the average is below 40. There is no limit to the motor truck's endurance; it is simply a question of drivers. This is advantageous during rush season or at rush times of the day or month, since no extra delivery service need be rented or otherwise provided for."

The question as to whether or not motor trucks, recognizing their fundamental necessity in our economic structure as an aid to the railroads, are paying their just proportion of highway construction and maintenance may be raised by some. Senator Charles E. Townsend, chairman of the Senate Committee on Post Offices and Post Roads, recently declared on the floor of the Senate that "there is no more reason why trucks should be taxed than freight-cars separately, because they are engaged in a business which is of the utmost importance. Trucks are in almost daily use. They are taking their place everywhere, and I think their use ought to be encouraged. Automobiles and motor trucks pay, perhaps, a heavier tax than is paid by the various implements used by the people. They are practically supporting the roads; they are maintaining the roads and in some of the states they are building the roads by the taxes that are put upon them."

THE operators of motor vehicles are willing to meet the cost of road maintenance and are doing so, as Senator Townsend's statement just showed and as is substantiated by revenue analysis. In 1920 the motor vehicle fees amounted to $102,546,212 of which only $59,414,039 was spent for maintenance of highways under the supervision of state highway departments. In 1920 motor vehicles paid in federal taxes alone $148,720,800.

The investment of the people in good roads is essentially a declaration of faith and vision in the prosperity and commercial prestige of our country. It was with the same foresight that the people, through the government at Washington upon learning of the future inauguration of ocean liners of the type of the Olympic, the Titantic, and the Majestic, saw to it that Ambrose Channel was deepened in order that these giant vessels might ply between New York and the continent of Europe. The channel was deepened, not only for these liners but for the good of the nation's commerce in general. In just the same way good roads are built on land.

For after all, in the last analysis, as A. Barton Hepburn of the Chase National Bank some time ago pointed out, the automobile industry produces "not mere cars and motor trucks, but transportation; exactly, as coal and steel and grain and cloth are basic necessities."

By the very nature of things, therefore, the motor truck has become an ally rather than a competitor of the railroad, making possible the permanent and intensive development of the long haul which is the logical and profitable field of railroad operation. Gerrit Fort, vice-president, Boston & Maine Railroad, substantiates this in characteristic language by declaring that "the motor truck has come to stay. It represents an economic change in transportation conditions which is little short of revolutionary. There is no use in fighting the motor truck. Within their own field the trucks are unbeatable."

Britain's November Exports

During last November British manufacturers exported 144 motor trucks, 160 passenger-cars and 77 chassis, having a total value of $1,606,170. Of the trucks, 30 went to British possessions (3 to Africa, 21 to India, and 6 to other places) and 114 went to foreign countries (102 to Smyrna, 5 to Argentina, the rest to other places). England reëxported 5 trucks, 15 passenger-cars and 27 chassis.

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Making Motor Transport Data Available

By DORSEY W. HYDE, Jr.
President, Special Libraries Association

SEVERAL years ago the Packard Motor Car Company adopted a new truck sales policy and advertised the fact that henceforth the services of a corps of "transportation engineers" would be available to advise truck purchasers as to the proper solution of their haulage problems. This step was decided upon in the belief that motor equipment must show a dollars-and-cents saving to the purchaser, if the original sale is to be justified. To carry out this new service a Transportation Engineer Division was organized at Detroit and transportation engineers were added to the staffs of a large number of Packard distributers.

The Transportation Engineering Division at the Packard factory, under the direction of a chief transportation engineer, became in fact an organization for the collection, classification, and distribution of motor transport information. On its staff were experts on truck construction and operation, motor truck equipment, truck operating costs, etc. The division issued a series of "Transportation Engineering Bulletins," a bi-weekly letter entitled "Transportation Topics," and a cumulation of distributer news. In addition a transportation school for truck salesmen was conducted, and this educational work was further supplemented by visits of field representatives to local distributing agencies.

A plan was adopted whereby all Packard distributers agreed to make weekly reports of their activities to the Transportation Engineering Division. In this way, all new fact information on motor transport problems was received by the central research organization for study and evaluation. All company departments at the factory were invited to send in data and information, and letters were sent to federal departments and to national associations and trade bodies interested in motor transport problems. Finally, much information was obtained from careful study of current automotive literature.

Efforts of this kind soon resulted in the accumulation of a vast quantity of highly specialized information of interest and value to the entire Packard organization. Most of the information was in the form of pamphlets, leaflets, typewritten reports, personal letters, clippings, forms and photographs. Very few published books containing information of the sort required were discovered.

After considerable study of the problem a transportation engineering classification was developed as a basis for a system of motor transport data files. This classification was worked out with particular reference to the needs of the Packard Truck Sales Department. The main subject heads of this classification were as follows:

Automotive Industries.—Covers all literature issued by automobile and truck manufacturers dealing with the history and policy of such firms, their products, methods of manufacture, administration, labor policy, etc.

Truck Manufacture.—To deal specifically with engineering, manufacturing and production methods of all companies engaged in the making of motor trucks or passenger-cars.

Truck Distribution.—To include information on all phases of advertising, selling and installation of all makes of motor trucks.

Technical Service.—Data on maintenance of product after delivery, manufacturers' guarantees, service policy, instruction in use, parts supply, office forms, etc.

Truck Equipment.—Data pertaining to equipment not furnished by the truck manufacturer, such as hoists, winches, portable loaders, special bodies, etc.

Truck Performance.—Information concerning truck operating costs, general use and abuse of motor equipment, and other items affecting truck operation and cost.

Transportation Engineering.—All data bearing upon transportation units, transportation routes, and the planning of transportation systems in accordance with approved engineering principles.

Competitive Data.—Comparative information about Packard and other makes of trucks.

Transportation Regulation.—Data on legislative regulation of transportation and the legal interpretations thereof, such as laws enacted by states regulating truck weight, rate of speed, etc.

Transportation Associations.—Publications of and information concerning activities of technical, trade and educational associations interested in transportation—particularly transportation by motor truck.

The main subject heads of the Motor Transport Data classification were "broken down" to cover all outstanding subjects included in the field. The classification in detail is as follows:

A. Automotive Industries.
A1. HISTORY AND POLICY.
A1. 1 General History.
A1. 2 Officers and Departments.
A1. 3 Inventions.
A1. 4 Processes.
A1. 5 Car Models.
A1. 6 Catalogues.
A1. 7 Tractor Companies.
A1. 8 Specifications.
A2. ORGANIZATION.
A2. 1 Board of Directors.
A2. 2 General Manager.
A2. 3 Departments.
A2. 31 Engineering.
A2. 32 Manufacturing.
A2. 33 Production.
A2. 34 Distribution.
A2. 341 District Managers.
A2. 342 Government Business.
A2. 343 National Business.
A2. 344 Foreign Business.
A2. 345 Direct Branches.
A2. 346 Distributers.
A2. 347 Sub-Branches.
A2. 35 Legal.
A3. FINANCES.

B. Truck Manufacture.
B1. ENGINEERING.
B1. 1 Investigation.
B1. 2 Design.
B1. 3 Testing.
B2. MANUFACTURING.
B2. 1 Raw Materials.
B2. 2 Parts.
B2. 3 Assembly.
B2. 4 Special Equipment.
B3. PRODUCTION.
B3. 1 Routing.
B3. 2 Testing.
B3. 3 Despatching.
B4. TRUCK UNITS.
B4. 1 Power Plant.
B4. 11 Engine.
B4. 12 Gasolene System.
B4. 13 Ignition.
B4. 14 Cooling.
B4. 15 Lubrication.
B4. 2 Transmission.
B4. 21 Clutch.
B4. 22 Drive Shaft.
B4. 23 Universal Joint.
B4. 24 Differential.
B4. 25 Transmission Gears.
B4. 3 CONTROL SYSTEM.
B4. 31 Steering.
B4. 32 Brakes.
B4. 33 Spark.
B4. 34 Gears.
B4. 4 RUNNING GEAR.
B4. 41 Frame.
B4. 42 Springs.
B4. 43 Axles.
B4. 44 Wheels.
B4. 5 EQUIPMENT.
B4. 51 Tires.
B4. 52 Fenders.
B4. 53 Hood.
B4. 54 Body.
B4. 55 Miscellaneous.

C. Truck Distribution.
C1. ADVERTISING.
C1. 1 Packard Publications.
C1. 11 Freight Digest.
C1. 12 Inner Circle.
C1. 13 Special Bulletins.
C1. 14 Catalogues.
C1. 15 Transportation Engineering Publications.
C1. 16 Handbooks.
C1. 2 Special Campaigns.
C1. 21 Carriages.
C1. 22 Trucks.
C1. 3 Competitors' Advertising.
C2. SELLING.
C2. 1 Sales Campaigns.
C2. 11 Fuelizer Fracas.
C2. 2 Truck Sales School.
C2. 3 Selling by Analysis.
C2. 4 Sales Organization.
C2. 5 Market Analysis.
C2. 51 Registration Method.
C2. 52 Baltimore Plan.
C2. 6 Sales Statistics.
C2. 7 Competitors' Sales.
C3. INSTALLATION.
C3. 1 Business Analysis.

D. Technical Service.
D1. INSTRUCTION.
D1. 1 Owners.
D1. 2 Drivers.
D2. MAINTENANCE.
D2. 1 Service Letters.
D2. 2 Spare Parts.
D2. 3 Repairs.
D3. INSPECTION.
D3. 1 Periodical Overhaul.
D3. 2 Special Inspections.

E. Truck Equipment.
E1. TRUCK BODIES.
E1. 1 Dump Bodies.
E1. 2 Stake Bodies.
E1. 3 Ice Cream.
E1. 4 Refrigerator, etc.
E2. LOADING DEVICES.
E2. 1 Hoists.
E2. 2 Winches.
E2. 3 Cranes.
E2. 4 Conveyers.
E3. TRAILERS.
E4. ACCESSORIES.
E3. 1 Towing Hooks.
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Packard's transportation engineering data were filed in six legal-folder with steel filing-cabinets. A special system of metal tab press-board guides was developed by the cabinet manufacturer in accordance with Packard specifications. In devising this scheme emphasis was laid upon visual appeal of tabs and ease and speed in gaining access to needed material. Because of this careful arrangement it was unnecessary to compile card indexes to any great extent as the filing classification, with its alphabetical index, resulted in a "self-indexing" scheme.

The Packard experience in the development of an educational and informational service to company representatives in different cities throughout the country has clearly shown the need for careful attention to the problem of salvaging current information from the great variety of sources both within and outside the company organization. This information is the ammunition which enables the company representative to understand his individual task and to render intelligent and courteous service to the patrons of his firm. In hundreds of American firms information and data of this kind are not systematically collected; rather such data are overlooked, neglected, and finally scattered and lost. Because of this neglect the constructive activities of these companies are not adequately recorded and employee enthusiasm and team-work are reduced through lack of knowledge concerning company activities and the underlying spirit and purpose of the business.

Sixty Millions for Missouri Roads

The Missouri legislature has passed and the governor of that state has signed a measure making available $60,000,000 through bond issues for a hard-surfaced state highway system. Ten million dollars worth of bonds will be issued in 1923 and $5,000,000 annually thereafter. It is planned to secure the funds for retiring the bonds from automobile fees. The proposed new state highway system will embrace 7,000 miles of roads. At least 1,500 miles will be constructed of a type higher than gravel. Missouri already has 752 miles of highways under construction at a total cost of $11,119,585, of which about one-half is met by federal-aid.

FWD "Road-Builder"

One of the most recent developments by motor truck manufacturers is the "road-builder" truck, lately placed on the market by the Four Wheel Drive Auto Company of Clintonville, Wisconsin, manufacturer of FWD trucks. One of the features of this new truck is its short wheelbase of 105 inches, which gives it an exceptionally short turning radius and makes it valuable as a time saver in making turns on the narrow grades. This truck is designed to carry a 3-batch body of 3-ton capacity, the body to be operated by a horizontal hydraulic hoist and the tail-gates to be operated individually. The truck is also designed to be used as a tractor for trailing loads to the concrete mixers and for hauling road machinery.

Its specifications are as follows:

Capacity, 6,000 pounds; allowance for body and hoist, 2,400 pounds; weight of chassis with pressed-on tires, 6,175 pounds; wheel-base, 105 inches; track, front and rear, 60 inches; turning radius, 20 feet 6 inches; speed, 15 mi. per hour; wheels and tires, 36x7 front, 36x8 rear; clearance under lowest part of axle, 9 11/16 inches; clearance under transmission, 15 inches; length of frame, 166 inches; total overall length, including starting crank, 181 inches; width of frame, 36 inches; total width of chassis over hub caps, 74½ inches; capacity of gasolene tank, 20 gallons.

Motor—Wisconsin, 4-cylinder; bore, 4¾ inches; stroke, 5½ inches; horse-power, S.A.E. rating, 36.1; water circulation, pump; lubrication, force and splash.

Governor—Pierce.

Magneto—High-tension, water-proof, Eisemann G-4, 2nd edition, impulse starter.

Carbureter—Stromberg 1½ S.A.E. with hot-air connection, M No. 3.

Radiator—Tubular; capacity, 6½ gallons.

Cooling—Centrifugal high-speed water pump; high-speed fan.

Steering Gear—Ross irreversible, worm-and-nut type.

Clutch—Multiple-disk Hele-Shaw.

Transmission—Three speeds forward, one reverse, dog-jaw clutch type. The sub-transmission is directly connected with the transmission, cast in one housing, with a silent chain drive, driving the center differential.

Universal Joints—Blood.

Springs—Alloy steel, semi-elliptic front, and platform spring rear; front springs, 13 leaves, 2½ inches wide, 45½ inches long; side springs, 12 leaves, 2½ inches wide, 44 inches long; cross springs, 12 leaves, 2½ inches wide, 40¼ inches long.

Axles—Both axles, front and rear, full floating type.

Brakes—External service foot brake on driving shaft, 10-inch diameter by 3½ inches wide; external emergency brake 15¼-inch diameter by 2¾ inches wide.

The publishers of *100%* have drawn our attention to the fact that the article, "Centralized Control in Truck Operation," which appeared in the November issue, should have been credited to that magazine, in which it was published prior to that time.

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Electrics in Municipal Service

By F. AYTON
Chairman, Electric Vehicle Committee of Great Britain

TO MUNICIPAL authorities who are now faced, as never before, with the insistent need for economy in every direction, the employment of motor trucks for their haulage services should specially appeal. In general, those in England obtain loans for the purchase of motor transport vehicles, the government department concerned requiring the loan to be repaid over a term of 7 years. Prudence would indicate that anything purchased on such a basis should comply with the following requirements:

(1) Its assured useful life should be at least equal to the loan period, and this life should be obtained without abnormal cost for up-keep and repairs.

(2) There should be some degree of certainty that, apart from the wages of those whose operate it, the cost of working it and its efficiency will not greatly vary during its useful life.

Now, in regard to (1) the requirements, so far as present experience goes, is met in two types of motor vehicle, *i. e.,* those driven by steam and electricity. The electric has an assured life, in ordinary usage, of at least 10 years. There are in this country at the present time many electric vehicles running efficiently that were put into service at least seven years ago. In the United States, however, the electric was employed on a considerable scale several years before we made a start, and it is to that country that we must look for direct and convincing evidence of the longevity of this type of automobile.

Mr. La Schum, of the American Railway Express Company (which at the time was operating a fleet of 1,058 electric delivery trucks), read a paper in 1919, from which I extract the following upon the lasting qualities of the electric:

"We have found the electric capable of standing up in service for a period of some 11 years, and we still have in operation some of the electrics which were purchased in 1907. As a matter of fact, the electrics being manufactured today should, I believe, be operated economically for as long as 20 years."

As to condition (2), the electric vehicle draws its supply of power from the public electricity supply systems.

Central stations are beginning to appreciate the fact that the demand for electricity for charging the batteries of electric vehicles occurs at times when the demands of other classes of consumers are individually small or altogether absent, and that consequently the actual cost of supplying the extra output required for this purpose is but little more than the extra fuel, water, oil, repair expenses, wages, and capital charges entering either not at all, or to an infinitesimal extent, into the calculation. Consequently a very low charge per unit for this class of supply can be relied upon to yield a handsome profit. Such central stations as have had the foresight to take active steps to cater to electric vehicles have been well satisfied with the results.

The two points just discussed alone constitute a strong argument in favor of municipal authorities making use of the electric vehicle for their haulage services. On the one hand, we have a vehicle—the electric—which has an assured life of 10 years or more; it uses electrical energy generated from coal (the staple fuel of the country); and there is, moreover, the certainty that the cost of such electrical energy will not increase in the future—indeed, there is the strong probability that it will decrease. There is also the point that the efficiency of the electric undergoes comparatively little change with age. It is not affected by climatic variation.

There are, however, other cogent reasons why municipalities should give consideration to the electric. It is, for instance, clean and odorless, and in consequence does not detract from the amenities of the districts in which it operates. Upon the score of reliability the electric vehicle takes high place. The *Contractors' Record,* reporting, in December, 1918, an interview with S. T. Allen, the Borough Electrical Engineer of Wolverhampton, a man who has had considerable experience in the use of electrics, quoted him as saying: "I have found electric vehicles to have a reliability equal to something like 95 per cent of the working hours due to the simple mechanism, and, in consequence, of course, the up-keep charges are low." On this point also the experience of A. W. Blake, in connection with the electrics belonging to the Willesden District Council, may be cited. In a recent statement he said that of the 14 electric vehicles which were operating on house refuse collection in the district, one had run without any loss of time whatever throughout the 12 months, one lost half an hour, one lost one hour, one two hours, and one two and a half hours; and, taking the whole 14 vehicles, the whole time lost was only 99.5 vehicle hours, which represented only 0.3 per cent. of the whole working time.

The most important advantage which the electric possesses in comparison with other methods of haulage lies, of course, in its low over-all cost of operation, and this in spite of the fact that its initial cost is generally higher than that of other types. The mistake of thinking that a vehicle which is low in first cost will give the most economical results is well exemplified in the case of the Urban District Council of Pontypridd. W. E. Low, the council engineer and surveyor, has supplied me with figures showing the results of refuse collections in his district by (1) electric 2-ton trucks, and (2) Ford 1-ton trucks. The cost per ton collection by method (1) is $1.545, and by method (2) $1.990. The total expense incurred for gasolene, repairs, renewals, and cleaning in connection with the Fords exceeds the expense concerned with electric power, repairs, renewals, and cleaning, in the case of the electrics by 9 cents per ton collected—a difference of 18 per cent.

The simplicity of the electric is another valuable feature. In consequence, the vehicle is so easy to drive and control that any person of normal intelligence may be taught in a few hours to become a reasonably competent driver; those who have previously been driving horsed vehicles make as good drivers as any. This simplicity has of course, an important bearing on the repair bill, and it also goes to account for the long life of the chassis.

The majority of the municipally-owned electric vehicles are employed in the collection of refuse, there being 90 cities using in all 413 electric vehicles. J. A. Priestley, the Sheffield superintendent of cleaning, once remarked that "the history of the progress of electric vehicles in this country is very largely the history of their use in cleaning work." This is true; it is also true to say that this class of work is about the most trying to which any mechanically-propelled vehicle can be put, since it means constant starting and stopping. The electric has proved to be a very suitable type for this work, but the opinion is held by some that for journeys up to about 3 miles in total length from the place of disposal and back thereto there is still an advantage in horse haulage. Beyond this distance motor haulage, and electric in particular, unquestionably holds the field.

IN REFUSE collection, as in other classes of work, the cardinal requirements for obtaining satisfactory results from the employment of the electric are moderately good road surfaces and the proper utilization of the vehicle as a labor-saving machine. In regard to the first, there have been cases where the results obtained have been disappointing, due to the vehicle having been called upon to traverse a track, leading to a tip, which has been little more than a morass. If one expects a vehicle to travel across a field to reach a tip, it will be found that a considerable portion of the electrical energy stored in the battery has been consumed in this comparatively short distance, thus considerably reducing the total mileage capacity per charge, and incidentally putting strains upon the mechanism which the latter was never intended to carry. It is only asking for trouble and a big repair bill to put any type of motor vehicle, be it electric, steam, or gasolene, to work under such conditions. It will always pay to provide a good road to a tip.

As to the second requirement, when a manufacturer invests in a labor-saving machine, he is careful to see that the work is

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so arranged that the machine is usefully employed for the maximum number of hours in the working day; for only so can the overhead charges per article dealt with be kept down to the lowest figure, and full benefit be obtained in the way of cheaper production. The same considerations hold in regard to commercial motor vehicles. Where the electric has proved most economical has been in cities and towns where attention has been given to this point, as, for instance, in Birmingham, Glasgow, Nottingham, Sheffield, and other places.

The general haulage service of a borough engineer's department is a class of work in which the electric can show advantages and economies over other methods, and this claim is supported by the very satisfactory results obtained by the Ipswich Corporation and others.

A recent report upon the results obtained by the Corporation of Bootle in the use of electric vehicles for carting street sweepings and for gutter cleaning, states that comparative tests revealed that 1 electric and 5 men emptied 80 gutters per day at a cost of 88.32 cents per gutter, as against 1 horse and 1 man dealing with 16 gutters per day at a cost of 64.32 cents per gutter.

Electric vehicles are employed for street watering in several towns, notably Blackpool, Bootle, and Ipswich.

The experience at Bootle is that an electric water truck with a 900-gallon tank will replace 4 horses, and will deal with 43 loads per day, covering a distance of 22 miles, as compared with 22 loads by 1 horse over a distance of 6 miles. In this particular town the result of acquiring a fleet of 13 electrics for refuse collection, street-watering, and general haulage, has been a saving of $6,935.00 per annum after meeting all charges, including interest and sinking fund, stores depreciation, etc., $3,700.00 to the electricity department for electrical energy, $2,770.00 for garage rent, and $1,375.00 towards the treasurer's department.

Several municipal street-railway departments use electric tower wagons with entirely satisfactory results. The advantages of a vehicle which can be instantly started from the depot upon receipt of an emergency call are manifest. As the driving is so simple, several employes can easily be taught how to drive it, so that a driver can always be quickly obtained.

The haulage of coal and ashes in connection with municipal electricity departments is another sphere in which the electric vehicle has been the means of reducing expenses.

Electric omnibuses are in use at Derby, Lancaster, South Shields, and York. While such vehicles have, in regard to working expenses, proved highly economical, they are, in my opinion, lacking in sufficient speed. I hold the view, however, that it is only a question of a short time before it will be possible to place upon the market electric 'buses much more speedy than those now running. When talking of electric vehicles one has in mind vehicles propelled by electric power over ordinary road surfaces, and consequently the term covers the type commonly known as "trackless 'buses," operating from overhead trolley wires in a manner similar to electric street-cars. The latest examples are to be found at Bradford, Leeds, and York, with earlier types at Middlesbrough and Rotherdam. Birmingham is about to adopt them, and I foresee a rapidly enlarging field for the employment of this type of motor vehicle. True, it has not the mobility of the gasolene or electric 'bus, in that it is tied to routes along which trolley wires are provided; but its reliability and high degree of economy, coupled with the fact that, given reasonably good road surfaces, it can easily beat the others in the matter of average speed, are advantages of such value as to bring it into extensive use in the near future. I shall not be surprised if within a few years' time important combined passenger and freight-carrying services are established and run by such vehicles operating from trolley wires between important towns. Given good roads and the necessary capital, such services could be put into operation to-day; and with electrical energy at not more than 2.5 cents per unit, and a sufficient volume of traffic, they would undoubtedly prove financially successful.

Electric vehicles are also employed here and there by public authorities for carrying public officials on their rounds of duty as ambulances and as first-aid vehicles in connection with fire brigades. There is scope for a considerable extension in such use of the electric, with resultant advantage in reducing expenses.

Lorain Would Regulate 'Buses

An ordinance to regulate motor 'buses has been introduced in the Lorain, Ohio, city council and, after the first reading, action was postponed for a month. The ordinance provides for a license fee of $200 for each 'bus carrying over 10 passengers and bonds of $10,000 on each 'bus. Owners and operators are required to be American citizens and more than 21 years of age.

1922 Russel Axles

The Russel Motor Axle Company, Detroit, has announced a complete line of bevel- and internal-gear axles for speed trucks, motor 'buses, and heavy-duty trucks, comprising twelve models in all.

Three sizes of bevel-gear axles have been developed to meet the demand for axles for light motor wagons having nominal capacities of ¾, 1 and 1¼ ton. All are of the semi-floating type with housings of pressed-steel. Differentials are of nickel steel and the drive shafts of chrome-nickel steel. Spiral-bevel drive gears are used and the ball-bearings are exceptionally large. Ample braking facilities have been provided in internal and external forms.

Three new models of internal-gear axles have been designed for use with pneumatic tires only. They are similar to the heavier models except for the provision of larger brakes and faster gear-ratios to meet the requirements of speed truck and 'bus service.

Four models of internal-gear axles for solid-tired trucks are now available as in the past. These embody the features which have been peculiar to Russel axles, with refinements and improvements found desirable from experience in service. This line has been enlarged by the addition of two entirely new models designed for heavy-duty work and equipped with steel wheels. These follow the general principles of other Russel internal-gear axles, the load-carrying member being of chrome-nickel steel, heat-treated and turned from bar stock, and the housing being a single casting mounted in front of the dead member. The differential, bevels, pinion shaft and bearings are removable as a unit, and the bevel pinion and pinion shaft are integral. All gears run in oil, a single filling of which is sufficient for thousands of miles of running.

Brief specifications of all these axles are given below:

Bevel-Gear Axles for High-Speed Trucks.

Model.	Nominal Rating Without Overload.	Maximum Load Allowable on Spring-pads.	Diameter Axle Housing at Brake Supports.	Diameter of Brake-Drum.	Gear-Ratio.
2400-B	¾-ton	3,400 lb.	3 O.D 3/16" outer wall reinforced nickel steel tube 3/16" wall	15½ in.	6.33 to 1 5.28 to 1
3000-B	1-ton	4,000 lb.	3 O.D. 3/16" outer wall reinforced with nickel steel tube ¼" wall	16½ in.	6.33 to 1 5.28 to 1
3600-B	1¾-ton	4,600 lb.	3 O.D. 3/16" outer wall reinforced with nickel steel tube 5/16" wall	18 in.	6.33 to 1 5.28 to 1

Internal-Gear Axles for Speed Trucks and 'Buses.

(Used only with pneumatic tires.)

Model.	Nominal Rating Without Overload.	Maximum Load Allowable on Spring-pads.	Diameter Dead Axle at Spring-pads.	Diameter of Brake-drum.	Gear-Ratio.
3000-SI	1 -ton	4,500 lb.	2¾ in.	15½ in.	6.15 to 1
4500-SI	1½-ton	6,500 lb.	2¼ in.	16½ in.	6.6 to 1
6000-SI	2 -ton	8,000 lb.	2¾ in.	18 in.	7.4 to 1

Internal-Gear Axles.

(Used with solid tires.)

3000-I	1 -ton	4,500 lb.	2¼ in.	14 in.	8.2 to 1 7.0 to 1
4500-I	1½-ton	6,500 lb.	2½ in.	15½ in.	7.4 to 1 8.4 to 1
6000-I	2 -ton	8,000 lb.	2¾ in.	16½ in.	8.8 to 1
8500-I	2¾-ton	11,000 lb.	3 in.	18 in.	9.3 to 1 10.8 to 1
10000-I	3½-ton	13,500 lb.	3¼ in.	20 in.	11.8 to 1
15000-I	5 -ton	18,000 lb.	3½ in.	23 in.	12.13 to 1

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British Transport License Subject of Much Criticism

RECEIPTS EXCEED BUDGET NEEDS

The figures just furnished by the Ministry of Transport of the number of motor licenses issued from January 1 to November 30, 1921, and of the tax collected in that period in Great Britain as returned by the local authorities show a considerable increase in revenue over the estimated sum of $42,500,000. As very few would be taken out merely for the last month of the year, the figures represent, approximately, the licenses taken out for the year 1921. The total gross receipts shown in these returns amount to $51,062,290.

The following are the principal figures given in the returns:

Class.	Amount received for licenses.	Estimated number of vehicles to which licenses refer.
Cars taxed on horse-power	$21,010,170	250,000
Cycles	4,606,325	355,000
Invalid vehicles....	415	332
Motor trucks.....	14,123,000	135,000
Road locomotives etc.	346,615	2,600
Motor plows, etc...	22,725	18,100
Motor tractors,etc.	122,465	1,550
Motor hackneys....	8,022,330	76,000
Street-cars	50,915	13,583
General identification licenses.....	374,200	10,000
Exempt licenses (fire engines, ambulances, road rollers, etc.).....	.....	11,500
Total motor licenses	$48,679,160	873,665
Horse-drawn (private)	$ 889,460	225,400
Horse-drawn (hackneys)	164,850	43,800
Total horse-drawn licenses	$ 1,054,310	269,200
Miscellaneous receipts (driving licenses, arrears of duty, fee for lost licenses, etc.).....	1,328,820	.....
Total receipts...	$51,062,290	.....

Analysis of the figures shows that the yield to the revenue from cars averages $83.88, from trucks $106.20, and from passenger-carrying public motor vehicles $110.96. Street cars yield an average of $3.60 each. In all, 873,665 motor vehicles produced $48,679,160, or just $55.60 apiece; from 269,200 horse-drawn vehicles the revenue is $1,054,310, or about $3.88 each.

There has been, and is still, much opposition to the existing system of motor taxation. That it is not ideal by any means is obvious, for no tax which takes the shape of a standing charge can ever be a perfectly just, since vehicles are not rated on the amount of usage, or, in other words, on the factor of road destruction. The quarterly licensing method is, moreover, objectionable from the points of view of dealer and user. It is said that on this score the industry has lost during the past year a sum well exceeding $15,000,000, owing to the fact that owners store their cars during the autumn or winter or both quarters in order to avoid the taxation.

A third point is the formula originated by the Royal Automobile Club, and accepted by the treasury, for rating the horsepower of engines of private cars. As is generally known, no account is taken of the stroke of the piston under this scheme, with the result that engines are rated and taxed on the basis of, for example, 24 horse-power, which will give nearly 90 horse-power on the brake. Or, to take a less extreme case, the average 11-horsepower light car, taxed at $5,500, has a unit which will give an output of 25 horsepower, or even more. The evil of this inadequate formula does not lie merely in inefficiency and unfairness. It encourages designers to increase the stroke of an engine and to diminish the bore or cylinder diameter. The power is obtained in this way, but at a taxation rate, which does not necessarily bear the proper relation to the road-wear factor of the car.

It would, of course, be infinitely better if the government would impose a tax which would constitute a running charge, but the problem is not as easy as it may appear at first sight. A satisfactory system based on the taxation has not yet been arrived at, and the former levy on gasolene, for a reversion to which there is so much agitation at the present time, produced only $12,500,000. It is true that the commercial motor vehicle now bears its burden but a tax on gasolene is not sufficiently comprehensive.

That the time has come for an entire reconstruction of the national road system is apparent to all who have studied land transportation, and even for the maintenance of present highways large expenditure is required. To this end the necessary funds must be raised, and it must be admitted that the present system of taxation has brought in the required amount. That it is faulty in many details is readily allowed, and such items as the quarterly license and, in the case of private cars, the formula for horse-power rating undoubtedly call for urgentt reform.

Pending a reconsideration it is urged that there should be a reduction of 25 per cent. in the present scale of taxation, to take effect from the beginning of next year. In support of this contention it is pointed out that on May 5, 1921, Sir Eric Geddes gave a deputation from the Motor Legislation Committee a very definite undertaking that, if the money were found to come in in excess of the estimated budget, mechanical road traffic should not have to go on paying that excess when it would not be necessary on the agreed budget.

The present position is described as being that for the first 10 months' operation of the schedule of duties a gross sum of $52,189,985 has been received, so that, including horse carriage licenses, it is fair to assume a gross revenue approaching $55,000,000 for the full year, or a net revenue of over $50,000,000 for the Road Fund, as compared with the $35,000,000 stated by the Departmental Committee on Taxation and Regulation of Road Vehicles (1920) to be required, and the $40,000,000 subsequently assumed to be the figure on which the mechanical road transport interests had agreed. Thus, according to the memorandum, the net revenue, at a time of great industrial depression, is from 20 to 25 per cent. in excess of the agreed budget.

GMC Offers New Type Chassis for 'Bus Service

LONG WHEEL-BASE, LITTLE OVERHANG

Embodying several new features particularly designed and fitted to motor 'bus work, the new GMC 20-passenger motor 'bus, just announced by the General Motors Truck Company, offers another new unit of transportation in the 'bus field. By combining a long wheel-base with exceptionally long and flexible semi-elliptic springs, good riding qualities have been given the chassis as well as a balance which gives uniform comfort regardless of passenger load. The body, which is extremely roomy for its capacity, overhangs the frame but slightly. Bouncing, sideway and whipping, which have been common in 'buses with short frames and wheel-bases, are overcome by these features. Careful design has resulted in a sufficiently low chassis to insure absolute balance and absence of sidesway, with ample clearance from the roadway to insure perfect performance in rough and muddy country roads while, at the same time, presenting a pleasing appearance.

The power-plant is more than ample for the road speed of 30 miles an hour to which the 'bus is governed, and also to furnish pulling power for bad grades and unimproved roads. In test the 'bus, fully loaded, was driven at 25 miles an hour up a 4 per cent. grade on "high." The power-plant is of GMC design and manufacture and embodies removable cylinder walls, removable valve-lifter assemblies, pressure lubrication, dual cooling, superheated carburation and instantaneous and positive fly-ball governor.

The body for this new equipment is furnished with two seating arrangements, one adapted particularly to interurban 'bus operation and the other designed for city passenger work. The body is staunchly built of oak, reinforced with metal, and is finished outside in smooth paneled surfaces which take a fine paint job and present a lustrous finish. Because of the general narrowness of roads all through the country, the body has been built to a width of 74 inches and by an ingenious seating arrangement no comfort or balance has been sacrificed. At the same time the width offers more safety in traveling through traffic in narrow roadways.

The interior of the 'bus is finished in paneled oak with rattan seats. It is complete in every detail, including non-rattling adjustable windows, complete buzzer signal system, front entrance door, controlled from driver's seat, and rear emergency door. Special attention has been paid to the front door design. The step is low and broad making it particularly safe against accidents. A rear-vision mirror, dome lights, and an advertising card rack are among the other refinements.

The 'bus is mounted on 36 by 6-inch cord tires all around. One other new provision is the fuel tank, located outside, and filled from there without inconvenience or fire risk. A vacuum system carries the fuel to the engine.

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Novel Form of Body Hoist Evolved by Swiss Concern

GIVES DUMPING ANGLE OF 60 DEGREES

The makers of the Saurer trucks in Switzerland have a reputation for bold innovations in design, and their new special dumping body for refuse collection is most decidedly a typical example of this. The point of application of the power for dumping bodies has been recently the subject of much thought, but to lift the complete body by fixing an axle to it at the rear and turning the axle round is indeed a bold move. This new dumper has already a considerable vogue abroad. The chassis generally is of the standard construction, corresponding to the Saurer model A2E, but to assist in keeping the loading level low smaller wheels than usual are provided, and the action of the dumping mechanism has necessitated a strengthening of, and certain additions to, the frame.

The body itself is of sheet steel, and is 12 feet 9 inches long by 9 feet 7 inches wide, its average depth or height being 2 feet 7 inches. It is built of rather thicker metal than is usual for this work, and is very carefully stiffened in order to withstand the strain of being lifted for dumping from its rear end with no other support. The top is inclosed by six covers. Each door is hinged on the central line of the vehicle, and is held open by a pair of rods supported in catches on the side of the body. Each rod has a disk at its end and one approximately at the center, so that the door may be held either full or half open, the rods folding back over the door and being clipped into place when the door is shut. Care is taken that the doors, when shut, shall be really dustproof, so each is provided with two toggle latches.

At the rear end of the body is the tail gate, which, as is usual in this type of body, is hung from its upper edge so as to open automatically as the body rises. Here again, great care has been taken to keep the door completely dustproof, when closed. An ingenious lock is used for this purpose; a shaft extends the full width of the body above the door, and is provided at each end with an eccentric to which the door itself is attached. By giving a half turn to the jointed handle at the near side of this shaft, the door is dropped or raised about one inch. As it is dropped, seven wedge-shaped blocks fit snugly into catches provided for them, two on the top, one at each side, and three along the lower edge of the body. The leverage obtained by the handle is sufficient to wedge the door firmly shut against all dust.

The dumping mechanism itself works under hydraulic power derived from the engine. Attached to the transmission is a small oil pump connected to the jackshaft through a clutch. The pump is thrown in and out of gear by a lever within easy reach of the driver's hand. This lever has three positions. When pulled right forward it lets in the pump clutch, and the pump at once supplies high-pressure oil to the hoist. In the neutral position the pump is declutched, but no oil can pass through it, so that the body is held steady in any position. In the third position of the level the pump is still declutched, but a relief valve is opened, so that oil can pass backwards from the delivery pipe to the suction pipe; this relieves pressure in the hoist, and the body immediately falls. In order to control the rate of fall of the body, a non-return valve is provided in the oil circuit, which, while allowing free passage of oil when lifting the body, only allows the oil to pass through a quite small aperture when the relief valve is open, so that the body falls quite slowly and gently, and there is no possibility of damage being done by a sudden drop.

The lifting mechanism itself consists simply of a very large cross-shaft supported by bearings on an extension at the rear of the frame. This shaft is rigidly attached at its two ends to the structure of the body itself, the attachment being by means of two bolted and riveted plates at the extreme end of the lower edge of the body. With this arrangement, all that is needed to raise the body is to turn this axle through an angle of approximately 60 degrees. Within the casing which incloses all the central part of the shaft are two short lever arms rigidly fixed to the shaft. Each of these has towards its extremity a cup, into which fits a ball on the end of the hydraulic ram plunger. Thus, as soon as high-pressure oil is supplied to the two rams, the plunger of the ram is immediately pushed out, and its ball end, fitting in its cup, causes the shaft to rotate, and this lifts the body.

It is obvious that the actual force exerted by these rams will be very considerable: the body, when loaded, will contain 2 or 3 tons of material, the average distance from the lifting center being some 5 or 6 feet, while the pressure is applied to the shaft by the rams at less than a foot leverage. It is, therefore, certain that the actual pressure on the ram pistons will be anything from 10 to 20 tons. Naturally, the reaction from this pressure will tend to twist in the opposite direction the whole of the casing which holds the ram cylinders. To take up this twisting force, the casing is most substantially built, and it is provided with a pair of powerful tie-rods connected to the frame about half-way along the rear springs.

The oil which the pump supplies to the rams is drawn from the main casing itself, a convenient filler-cap being provided in the rear of the casing. When the body is fully lifted, it automatically opens a valve which causes the oil delivered from the pump to pass straight into the casing instead of into the rams; thus there is no possibility whatsoever of overlifting. A further refinement, typical of the admirable attention to detail in all the Saurer products, is that a small auxiliary pump is operated from the shaft as soon as it moves, and pumps oil to all the shaft and ram bearings, thus keeping them efficiently lubricated.

It will be seen that the whole of the mechanism, both the pump on the transmission and the hoist itself at the rear of the chassis, is completely inclosed. When it is remembered that a large proportion of the dust handled consists of either flint or stone from street sweepings, or of hard particles from fire cinders, it will be appreciated what great damage can be done unless all the moving parts of the chassis are adequately protected against it.

In actual operation, the complete raising and lowering of the body does not last longer than about 60 seconds. The tipping angle is so great (60 degrees) that there is no delay at all in the actual fall of the refuse from the body, which is a most important point. While running to and from the tip the crew of loaders stands on a special step provided at the rear of the vehicle. As a general rule, at any rate when collecting in continental towns, the vehicle does not actually stop, but proceeds at a very slow walking pace, the ash buckets, etc., being tipped into it while still moving.

New Hare Organization

E. S. Hare, Incorporated, has taken over the earlier corporation Hare's Motors, Inc. It is formed and headed by Emlen S. Hare, who, until his venture under his own name in the latter organization had enjoyed a highly successful experience in the Packard Motor Car Co., rising within a few years from the post of retail salesman to that of vice-president at the factory.

"I am rapidly rounding into a position," said Mr. Hare, "where it will be possible for this organization to offer dealers from one to several non-competitive automotive accounts. In this way the dealer will transact business with one organization, and will be able to contract for one or more accounts, or whatever number—depending on location and present accounts—is desirable to give him a well rounded out and profitable account. E. S. Hare, Incorporated, will be in a position to furnish dealers with the necessary financial assistance."

A. G. Hare, a brother and a member of the firm of Hare & Chase, is a vice-president. H. D. Church, who was a vice-president of the Hare's Motors, continues in the same capacity with the new organization, and B. G. Lewis, at one time a member of the Packard organization and later with the Hanff-Metzger Company, New York, resumes his personal association with Mr. Hare as a vice-president of the company. W. G. Toland, formerly general sales manager of trucks for Hare's Motors, is secretary-treasurer of the new company, and assumes general charge of the organization's sales as well.

Aside from these principal officers the organization has been expanded. Frederick Miller, formerly in charge of the eastern district for the Packard Motor Car Company, and at one time in charge of the Packard New York store, has become a field representative for Hare, and Victor Bensch has been added to the operating staff. William Carl Chapman, who has been with the Hare organization almost since its inception, has been made advertising manager. Mr. Hare proposes to operate not only by assisting manufacturers in designing and straightening out their sales policies, but by taking over their distribution immediately or at some time later on after their sales policies have been properly analyzed.

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Correspondence

General Correspondence, Criticisms, Suggestions, and Discussions Concerning Any Subject of Interest to Those Who Design, Manufacture, Sell or Use Commercial Motor Vehicles, Their Parts or Accessory Equipment, Are Solicited

"A Normal Year"

To the Editor.—I believe that you hit the nail on the head in this editorial ["A Normal Year"] and that the present situation will eventually benefit those manufacturers who learn the lesson that the times are teaching. Speaking for ourselves, we can say that when the present depression in the truck line hit us, we immediately turned our attention to those lines of business which we could develop into buying and using trucks. We picked out the road-building activity as the most likely and, from our study of the contractor's problems and our activities in designing and building hoppers, turntables, etc., to enable the truck to render 100 per cent service, we feel that we will eventually get a lot of business from this work, and indications are that 1922 will be a "record breaker" for us.

This fighting for business is developing real salesmanship. It is creating systematic methods and effective ideas—it is creating initiative and organization along the right lines—and we feel that, once business does return, we will be in a better position than ever to handle it the way it should be handled.

KISSEL MOTOR CAR CO.,
Hartford, Wis.
Ralph Kaye, *Advertising Mgr.*

The "Trade-In" Evil

To the Editor.—We regard the "trade-in" evil as the most menacing one to which the motor truck trade is subjected and, unless manufacturers and dealers will promptly get together and do their merchandising along saner methods for the future, it is going to mean that there will be even a greater amount of elimination throughout the trade than has as yet occurred. The probable upshot of it all will be that the motor truck business will eventually become centered in the hands of a few strong, well-established concerns who will be able to monopolize the industry, and in so doing, to a very large degree, dictate its conduct.

In a general way the plan proposed by Mr. Brooks of the Nordyke-Marmon Company, or some adaptation of the same should work out satisfactorily, if the necessary finance and organization ability were available. However, the trade-in evil has become so deeply imbedded in automotive sales and withal amounts to such an enormous amount in dollars and cents, that it is going to be no before-breakfast job to correct the present situation, however much all of us may use our influence in that direction. Speaking for this company, I wish to say that we shall be more than glad to continue coöperating in the fullest measure possible with any movement which has for its object the elimination or even mitigation of this very troublesome problem.

GRAMM-BERNSTEIN MOTOR TRUCK CO.,
A. E. Schafer, *Gen. Sales Mgr.*
Lima, O.

Eliminate Unsound Methods

To the Editor:—We think "A Normal Year" is a very excellent editorial and believe that you deserve congratulations for the work that you have done and are doing to stabilize the motor truck industry. We believe it is highly important that the unsound and unethical methods that are being pursued by certain manufacturers should be severely criticized and all possible pressure brought to bear to eliminate such practices for the future good of the industry.

GENERAL MOTORS TRUCK CO.,
E. T. HERBIG, *Sales Promotion Mgr.*
Pontiac, Mich.

Age in Selling

To the Editor:—The salesman is a living advertisement, carrying individuality, conveying impressions, favorable or unfavorable, according to his methods of approach, his tact, his appearance, and his general diplomacy in handling various inquiries and customers. Every time he speaks he is advertising the goods of his firm; every time he advances to meet a customer in prospect he begins to advertise the firm and the firm's goods. Does age count in promulgating this live advertising? After a long experience of salesmanship in motor truck showrooms, "on the road," and at exhibitions, the influence of age in the process of selling has, it seems to me, an important bearing on one's progression as a salesman. Personally, I am not inclined to think that age does count even in our own industry.

You can not put old heads on young shoulders, neither is it wise to try to instill into very young men that knowledge and experience that can be gained only by the progress of human life itself, and the natural assimilation of things that come with it. As the years roll by, lesson after lesson is learned, failures are experienced, mistakes are committed—out of the medley of ups and downs there comes a refined experience, stability in reasoning, a chastened character, possibly a few grey hairs, and possibly also a partially bald cranium—they inspire confidence because they are marks of maturity; the salesman who has been at the work for years is expected to know, and does know, how to sell intelligently, to converse interestingly, to make an impression on the person he is brought face to face with. He sells the goods. Does age count? Frequently it does count.

Most of us know that appearance counts, too. It is questionable, nevertheless, whether the dealer purchaser at a motor exhibition is much impressed by a salesman who conducts his exhibition business with gloved hands. It may appeal all right to the private purchaser, but your dealer is too practical a man to be impressed by overdress; generally he would prefer to interview a man straight from the shops even with his finger nails in mourning. His knowledge would be more useful to the inquirer and his talk more intensely practical. Next to a presentable presence does the salesman's age count? In the case of costly goods such as motor trucks I am inclined to say it does. The purchaser's outlay is considerable and calls for pre-discrimination; it requires also a matured selling experience to assist that discrimination to an issue completely satisfactory to both parties.

NEARLY FIFTY.
Cleveland, Ohio.

Kentucky 'Bus Men Unite

The Kentucky Bus Owners' Association was organized at a meeting of the 'bus owners of Central Kentucky, in the office of Kittrell and Callaway of Lexington. J. E. Kittrell was elected president and J. Walker, secretary and treasurer.

The object of the association is to improve the services of the 'buses in that vicinity and to assist in furthering the interests of the 'bus business. It was stated at the meeting that there are now 96 'buses operating in and out of Lexington daily, which cover a total daily mileage of 2,160. The average number of persons being brought to Lexington daily by 'bus was said to be over 2,000 and the number is increasing.

The following 'bus owners were present at the meeting: Fred Weckesser, Paris, operating the Reo Comfort 'Bus Line between Paris, North Middletown, Mt. Sterling and Owningsville, as well as the line between Winchester, Clintonville, Paris and Georgetown; W. E. Hichols and J. Walker, of the Central Kentucky Auto 'Bus Line who operate lines to Nicholasville, Georgetown, Winchester and Versailles; G. Southworth of the Reo Rapid Transit Company, who operates two 'buses between Lexington and Paris; Newton Bishop, who operates the 'bus between Lexington and Cynthiana; H. A. Patton, operating one 'bus between Paris and Carlisle; Gilbert Barnes, of J. Barnes & Son, who operate 'buses to Richmond, Winchester and Nicholasville; E. R. Webb of the Reo 'Bus Line, who operates 'buses to Stanford, Lancaster, Bryantsville, as well as to Keene, Troy, Shakertown, and Harrodsburg; George Farnham and Earl Henderson, operating two 'buses in Lexington.

Many Stage Lines in Washington

The State of Washington stands next to California in the volume of its motor stage and truck traffic, says the annual report of E. V. Kuykendall, state director of public works. The state during 1921 granted certificates to approximately 300 stage lines. Last available department records show that the stage lines did an annual business of more than $750,000.

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Motor and Highway Engineers Must Co-operate

By H. G. SHIRLEY
Secretary, Federal Highway Council

THE past design of highways has been rather uncertain, the selection of the type and thickness of the surfacing having been made by an empirical rule or determined by the judgment of the engineer in charge. Very often a type of surfacing has been used because it had given satisfactory service in some other locality. The engineer believed that the requirements would be no greater on the road under consideration, frequently without any study of the soils composing the subgrade and foundation. In many instances the subgrade and foundation have been of a character entirely different from that of the highway from which the conclusions were drawn.

The highways of the country are being built without the use of definite mathematical calculations and designs based thereon. The type and character of construction represent the judgment of the engineer in charge, rather than a logical known design. Before the advent of the heavy motor vehicle the surfacing would loosen up in the spring and heave when the subgrade had become saturated, but the traffic being light and the vehicle having iron tires the surface would be rolled back and reconsolidate as soon as the subgrade had dried out and settled. This would be repeated for a number of years before the surfacing would break up. But when a heavy motor vehicle strikes the surfacing over a saturated and yielding subgrade, it destroys it completely, and the effective service of the highway is greatly reduced and soon destroyed. Conditions have changed so rapidly that it is necessary now that some investigation and study be made of the subgrade so that it can be stabilized and its bearing power determined. This, together with knowledge of wheel and axle loads, will enable the highway engineer to design a slab or surfacing that will have the required strength to carry the specified load safely. Not until these two factors are known will we be able to solve the equation. In the meantime road designing will be erratic and like guess-work.

Motor-vehicle builders and users have aimed much unfavorable criticism at the highway engineer because of failures of highways built 10 or 20 years ago. Motor-vehicle designers would not claim that the vehicles sold to the public 10 or 15 years ago are as usable and capable as the vehicles sold to-day. I can recall the time when motor-vehicle models were changed about every six months, and few remained unchanged longer than a year. Motor-vehicle design has become more stabilized but is changing constantly to meet conditions. The history of the highway is just the same; it occupies the same position relatively as the vehicle.

The motor-vehicle producer and owner would not acquiesce in a plan that would put an unlimited load on their vehicles. They would not adopt as a slogan, build the truck to carry the load, regardless of the limit of its capacity. But the highway engineer is told daily to build highways to carry unlimited loads. No body of men is more interested in controlling the load carried by the vehicle, and properly so, than the motor-vehicle builders and owners. I congratulate them on the position they have taken against overloading the vehicle, but they should not criticize the highway engineer for taking the same position with regard to the highway. It is just as important to carry the principle down to the road surfacing and the subgrade. It is my opinion that in the near future maximum wheel and axle loads will be specified for each class of surfacing. Highway engineers and motor-vehicle producers and owners must work out a logical and economic unit to be operated over the highways of the country, and determine the reasonable wheel and axle loads to be used. When this has been done and the research departments now engaged on the problem shall have determined the bearing power of the subgrade, the highway engineer can proceed to design a surfacing that will carry the specified load throughout the entire year without danger of its being destroyed.

This is the foundation on which we must build, and before such a foundation shall have been determined, the problem of highway design will not be solved and there will be a gross waste of public funds. Aside from the matter of highway bridges, highway engineers are not interested in gross loads. The gross load can be made exceedingly heavy, provided it is distributed over the proper number of axles and wheels. This can be accomplished by using trailers or employing additional axles and wheels under the truck, whichever is more economical, but a limited wheel load must be established and adhered to strictly, if the highways of the country are to be standardized and built so that they will perform the work they are supposed to do without being destroyed.

The soils composing subgrades are very diversified and have numerous characteristics. This makes the problem very complicated. The soils must be classified. Their bearing power must be determined in such a manner that the information can be used by the engineer and the contractor on the work. The problem must be reduced to a practical and simple basis on which the highways of the country can be built with an assurance of stability. The investigation of soils now being made by the Bureau of Public Roads, leading highway departments and universities, probably will result in some method of determining and improving their bearing power, possibly by chemical or mechanical treatment. If so, the unknown quantities will then become known and the engineers will be able to design highways and railroads just as exactly as motor trucks and highway bridges are designed to-day.

Political interference in highway building makes it difficult to construct a road as it should be constructed. Appropriations are usually made to cover the cost of a highway between two stated points. This may be so great a distance that only by using a very narrow and thin surfacing can the work be done within the appropriation and such a surface is inadequate to meet the traffic conditions of the near future. When the highway engineer is given instructions to build such a highway and to select a type and width that will make the appropriation cover the cost of a road over the entire distance, he must carry out the instructions even when he knows that a great mistake is being made. Such a highway will have only a short life and high maintenance charges and be altogether an economic mistake. These political conditions are impossible of control and will remain so until public sentiment demands that the building of highways be placed in the hands of men specially qualified to do such work. The highway engineer must gain the confidence of the public in such a way that it will leave much to his own judgment and skill.

The highways of the country are being built just as well as the public demands and sometimes better. The value of a highway to a community or a state compensates for the cost of its construction and maintenance, even if it render service for only a few years. It is necessary very often to build a road of an inferior type so that it can earn enough money to replace itself with a higher type. The amount saved in operation over an improved as compared with an unimproved highway is such that, if capitalized, a fairly well traveled highway can be resurfaced annually.

The aggregate of the appropriations available and the great amount of money that will be appropriated from time to time make it essential that the design, construction and maintenance of highways be put on a known basis. It is very necessary that designers, producers and owners of motor vehicles co-operate with highway engineers and devise a plan that will provide for a definite wheel and axle load and a maximum speed. When this has been done, the public should be educated to depend upon highway engineers for a thorough study of the traffic and to design highways that will carry present and probable future traffic in the most economical way. The public should realize that such highways will have longer life, perform greater service and eventually be more economical in every way, although their first cost is greater. Unless designers of motor vehicles and highway engineers can agree upon what constitutes reasonable wheel and axle loads, we can not expect very much improvement in highway work. I trust that they will co-operate to a greater degree soon and thresh this problem out and arrive at a definite conclusion. Then we can proceed with the construction of our highways and know that the money appropriated will be so expended as to render the greatest service.

During 1920 China imported $4,276,979 worth of motor vehicles from all countries, as compared with $2,934,078 in the previous year.

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Barron's Speech Provokes Some Comment Pro and Con

ACCUSED OF FABRICATING EVIDENCE

The recent address of Clarence W. Barron, publisher of the *Boston News Bureau*, before the Economic Club in New York, has ruffled the feathers of more than one listener. In the course of his remarks, which were inspired by a desire to save the faces of the railroads in this, their critical time, he took occasion to make a few back-hand slaps at the motor industry and the great burden of carrying the cost of road improvements. "You are today taxing these railroads to put a cement surface upon your public motor highways at a cost of $40,000 per mile just for a surfacing 18 feet wide," he said among other things, and then asked, "Can you base prosperity for peoples and properties on such injustice?" To all of which John N. Cole, commissioner of the Massachusetts Department of Public Works, felt urged to reply as follows:

Every year some economic writer asserts that the saturation point has been reached in the development of the motor vehicle, and every year the figures of such a department as this give the lie to such a suggestion. Not only is January, 1922, the biggest January in the history of the state department of public works for motor vehicle registration, but it represents a phase of the use of the motor vehicle that is very striking.

Almost every year for the last five years the average registration of all types of motor vehicles has increased in excess of 20 per cent. In 1921 Massachusetts had reached the average of a trifle over one motor vehicle for every ten of its population.

Up to 1915 Massachusetts fees were from pleasure cars. Of 100,000 motor vehicles in this state in 1914 less than 7 per cent were motor trucks. In 1920 pleasure cars and trucks registered were 304,538, and of these, commercial motor vehicles were 53,000, or 17 per cent. To-day the motor fees represent approximately one-sixth of the annual highway cost.

In 1907 the state of Massachusetts spent $600,000 on its highways, but in 1921 it spent $9,000,000. The counties spent practically nothing for new construction in 1907, but expended nearly $1,400,000 in 1921. In 1908 the cities and towns spent about $3,000,000 on highways, and in 1921 nearly $27,000,000.

In 1921 the total amount collected by the state from motor vehicles for highway improvement was about $5,500,000, or less than one-sixth of all the moneys expended on highway improvements in the state that year.

The cost of a macadamized road formerly averaged $6,820 per mile. The demands of present-day traffic, to which the truck contributes the largest part, calls for an average cost in excess of $40,000 per mile.

The necessary work for widening, draining, surfacing and strengthening the foundations of existing state highways involves an expenditure of not less than $40,000,000 within the next ten years. More than 2,000 miles of improved secondary highway will call for not less than $26,000,000 additional. There are other demands for road widening and construction which, if met will add $15,000,000. Highway bridges are wholly inadequate for the strain and at least $20,000,000 must be devoted by the state, counties and towns to meet this serious situation the next ten years. In brief, the state is faced with the expenditure of $90,000,000 within the next ten years to meet the cost of motor transportation in addition to the annual needs for regular maintenance.

Engineers seem agreed that such a thing as a permanent highway is as yet unknown, and present costs should, therefore, not be passed on to posterity. There is a bill before the Massachusetts legislature to increase the fee of passenger-cars 60 per cent, and for a 3½-ton truck carrying its normal load, to $85, and for the overload, fixed at a maximum of 9 tons, to $140. The proposed fee for a 5-ton truck is $105, and for an overload of maximum 9 tons, $140. Present fees are based on the assumed carrying capacity of the truck at the rate of $10 per ton, or $50 for a 5-ton truck. It is proposed to fix the legal limit for trucks at 28,000 pounds, including tare weight and load.

Recent inspection by this department showed 64 out of 86 trucks stopped in one day were carrying above their rated capacity. A 2-ton truck was carrying a load of 6¼ tons and paid but $20 a year for the free use of the highway or roadbed. A 5-ton truck was carrying 12 tons and a 6-ton truck over 13 tons.

The above figures of costs give no consideration to the problem of safe roads, requiring a very large expenditure for marking dangerous points, widening curves, providing effective signs, supervision of a hundred and one phases of the motor development—all just as directly related to the use of the motor vehicle on the highway, as elimination of grade crossings, danger signals, safety appliances, air brakes and many similar things discovered to be so important in connection with the development of the modern railroad system. An enormous problem is involved, and the public must realize that the biggest contributing factor to its solution should be the biggest beneficiary.

But now comes William P. Kennedy, consulting motor transport engineer, and after characterizing Mr. Barron's address as "part of the general propaganda set on foot by the railroads to make the public believe they have been maltreated by everyone, including the government," proceeds to say:

As a matter of fact they are simply reaping the reward of their own past performances, or at least the performances of those who own and control raidroads, whose tactics have been made known to the public in various ways during recent years and have turned public opinion against them—otherwise the legislation and other restrictive handicaps of which they complain could not have been put into effect.

You have only to read in the current issue, February 11, of the Dearborn Independent, an article by C. A. Collman, to learn how railroads were milked, and how their securities on which they are supposed to pay returns were fabricated. Or, going back a little further, to read in the New York Times of March 27, 1921, the able presentation by La Follette of the way railroads are controlled by a comparatively few Wall Street individuals. The exposure of facts like these shows the railroad situation for what it is to-day.

While some of the facts and figures presented are apparently true, in some other instances it seems from his figures that he has manufactured the evidence in basing the value of railroad properties on their cost of replacement under existing conditions and in making a line of contrasts which are inconsistent with each other. I think that if anyone were interested in taking the opposite side from Mr. Barron it would not be very difficult to do so effectively. The whole thing looks like an attack upon the competing motor truck and the highways as his entire argument is summed up with this object in view, and this is the reason why automobile interests should bestir themselves.

As for the letter of Commissioner Cole, this is such a jumble of figures that it would not be interesting except for three facts. First, it looks like predetermined coöperation with Mr. Barron; second, it discloses his antagonism to a very large section of his community, which has given him his job and pays his wages, and which he probably forgets includes the most important citizens in his section; and, third, that, like all politicians, he appears to be a poor business man, because he tries to contrast the annual income received for road use, not against the running cost of maintaining the roads, but against the amount of fundamental investment that happens to be put into the road foundations.

The real fact which he shows up is that under present license rates the state collects only one-sixth of its investment in road construction. Offhand, this represents a return of 16⅔ per cent., which indicates that the investment would be refunded in a very short period.

The L. C. Graves Company, truck body-builder of Springboro, Pennsylvania, is in the hands of receivers as the result of a petition presented by the stockholders and creditors. A. H. Palm and F. T. Weaver have been appointed temporary receivers.

Railroad Officers Approve New Gasolene Rail Motor

TRAVELS AT 35 TO 40 MILES AN HOUR

A new type of gasolene rail-car has successfully passed rigid tests conducted by railroad experts and is now being adopted by many leading railroads throughout the country for branch-line service. Wherever it has been installed, this gasolene-propelled car has brought about many marked improvements in rail passenger service. Particularly are these improvements noticeable in the suburban lines of the New York, New Haven & Hartford Railroad, where three such cars, designed by the International Motor Company, are now in regular service.

According to W. L. Bean, mechanical assistant to President Pearson of the New Haven road, the gasolene rail-car embodies many decided advantages when compared with steam or electrified service on branch-line runs. For frequent and speedy service at low cost this new car has no equal. Its use also makes possible the elimination of the usual expensive terminal facilities such as coal-storage bins, water-tanks and ash-pits. Furthermore, it is said that the running costs are no more than one-third of those for operating a 2-car steam train, and the railroad men are enthusiastic in their belief that the gasolene engine will enable them profitably to solve their short-line problems.

This saving in operating costs, combined with the comparatively small capital investment required, is not at all one-sided but will have a far-reaching effect. For example, records of the Interstate Commerce Commission show that during 1921 operation was suspended or discontinued on over 1,600 miles of railway principally because the revenues obtained were insufficient to support the costly steam-train service. Obviously, the lack of adequate transportation facilities for sections of the country brought about by such railroad retrenchment has greatly retarded commercial and social progress. Efficient economic railroad service can now be restored to these neglected areas by means of gasolene rail-cars with beneficial results that can not be measured. At the same time, a frequent passenger schedule is now made possible on the many branch lines throughout the country where, up to the present time, a few trains a day have been attempting to meet the public demand.

Those who have ridden in this new rail-car have pronounced it the "limousine of the rails" because of its unusual riding comfort. This ease in riding is made possible by a new method of spring suspension constructed so that the ends of all springs are carried in a heavy moulded rubber block instead of being suspended by an ordinary spring-shackle. The absence of dirt, smoke and cinders so common with steam trains makes travel by rail-car an added pleasure. Moreover, the design of the car affords unlimited opportunity for the appreciation of scenic beauties, for the vision is unobstructed not only to the sides but also to the front.

In appearance, the car resembles the

(*Continued on page* 37.)

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Truck Body-Building Problem Proves Serious

CONTRACT WORK BY BODY MAN BEST

Speaking on the subject of "Commercial Body Supply and Service" at the recent Society of Automotive Engineers' meeting in Chicago, C. B. Veal, co-author with C. N. Manley, specified four general plans of securing body equipment. He said in part:

"Four distinct general plans have been followed by chassis builders in securing body equipment:

(1) Building in their own shop.

(2) Building on contract by body maker to plans and specifications of chassis builder.

(3) Building by local body maker to order of dealer or owner.

(4) Assembling from stock standard sectional units recommended by dealer or selected by owner.

"All four are available to a greater or less extent at present, and to determine the effect of each upon the ultimate question of service we will examine each plan as related to the interests of the chassis builder, the dealer and owner.

"Analyzing the first plan, that of building in their own shop, the effort expended in trying to build up a permanent business of selling the chassis and body as a unit is, with few exceptions, certain to be entirely out of proportion to the results attained. This is largely due to the need for such a wide variety of bodies except in certain lines where it is possible to get on a large production basis.

"The second plan, while it necessitates the chassis builder carrying a body-designing and engineering department, relieves him of the greater investment in shop and tool equipment and body fabricating organization. The body-builder, through his ability to furnish other designs of his own for the trade and to take on contracts to supply various chassis producers, is in a much better position than the latter to acquire an adequate volume of body business for efficient and economical production. Here the advantage to all concerned, as compared with the first plan, ceases, however, since the distribution troubles remain the same, with the possible addition of an initial freight shipment of bodies from the body-builder to the chassis plant, and the complications arising in repair service with the attendant embarrassment to the ultimate user through the interdependence of the chassis producer and the body-builder in all matters of responsibility affecting the guarantee, proper functioning, and durability of the body. Of the four methods applicable to the supply of bodies for trucks having national distribution under existing conditions undoubtedly this plan has the most to recommend it.

"The third plan, custom-built bodies, historically has been the accepted method of most motor-vehicle builders upon first entering the truck field and is still the plan generally followed by the majority of truck companies. This practice came into effect not through the application of any special economic theory but rather through the natural working out of conditions as they were and still are to a lamentable degree, especially in connection with heavy-duty trucks.

"The successful operation of the fourth plan has been made possible only comparatively recently, owing to a lack of sufficient demand and the continuous evolutionary changes in body requirements as the business developed. Through the adoption of this plan the chassis builder and the dealer derive a great many benefits. Not the least of these for the former is complete relief from the undertaking of body-building. While eliminating the capital investment involved in the first plan he simultaneously removes from his dealers the burden of body inventories common to the first and second plans. Moreover, he is assured that his chassis will not be abused by being made to carry a poorly proportioned or ill-fitting body of excessive weight or capacity. The dealer is further helped by overcoming the showing up of merchandising while waiting for each body to be built individually under the third plan.

"By building the bodies in sections and standardizing these sections it has been found possible to use certain sections for very many different types of these bodies. In some respects the scheme parallels, although in a very different field and with much greater economic possibilities, the flexibility and utility of the sectional bookcase. Standardization has been carried to such an extent that the reduction in the total number of competent parts has diminished noticeably the body-builder's investment in raw materials, work in process, and finished goods.

"Many major parts of bodies and cabs are interchangeable on various types of body. Starting with one platform or base, a choice can be made from several side panels, rear sections and types, thus making it possible to assemble any one of a dozen body styles on this one design of base. Likewise, doors and wind-shields used on cabs or vestibules can be assembled interchangeably with a variety of other body units. In fact, windshield, vestibule doors, vestibule side windows, rear doors, toe-boards, cushion and lazy-back are worked out readily, each in a single design common to all bodies of whatever model where any one of these items is required. A single end-gate can be used to equip several models."

For Newspaper Photographers

To get the maximum of speed in taking photographs of news events and developing the negatives, progressive photographers of Atlantic City, New Jersey, have constructed on a light motor wagon chassis a special body in the form of a giant Graflex camera.

The interior of the body is ingeniously arranged so that a man can climb up a ladder-like arrangement bringing him to a height of 10 feet from the ground, and giving him a commanding view of any events which may be taking place. The body is also used as a dark-room in which negatives may be developed and finished, guaranteeing speedy service, which would otherwise be impossible.

Motor Traffic Has Outrun National Road Development

FORMER GREW 18 TIMES SINCE 1910

Road improvement in this country has not kept pace with the growth in the use of motor vehicles, according to the statement of Thomas H. MacDonald, chief of the Bureau of Public Roads of the United States Department of Agriculture, in an address before the annual meeting of the American Association of State Highway Officials.

"During the period 1919-1921, the potential number of motor vehicles demanding highway service increased more than 1,800 per cent.," he said; "our actual expenditures for construction and maintenance increased about 400 per cent. During the period 1910-1918, motor vehicles increased more than 1,110 per cent., highway expenditures about 140 per cent. During the period 1918-1921, motor vehicles increased about 700 per cent., and highway expenditures about 260 per cent. of the 1910 figures.

But even these figures do not truly represent the differential between the demands for highway service and our actual production. Without attempting impossible refinements, if the cost index of 1918 be taken at 2 and that of 1910 at 1, the actual increase in production of 1918 over 1910 was only 20 per cent., and if the index for 1921 is taken at 1½, the actual increase in production of 1921 is only about 233 per cent. over the 1910 figure. That is taken as a national aggregate, the number of motor vehicles, all at least potential users of the highways in some degree, has increased in 11 years since 1910 more than 18 times. Our greatest annual production of serviceable highways measured by the construction and maintenance expenditures has been not more than 2⅓ times the production of 1910, and it has been only within the past three years only that production has gone forward at a rate approximately the maximum."

He points to four signs of outstanding progress in road improvement:

(1) The increased highway service made possible through the establishment of proper methods and the expenditure of more adequate funds for maintenance.

(2) The increased highway service resulting from new construction.

(3) The adoption and enforcement of better engineering standards.

(4) The improvement in the administration of highways as a public utility.

In speaking of principles that must govern future road-work, he said:

The really serious traffic problems lie around and between large centers of population. It must be remembered that for roads built previously many engineering details, such as alignments, widths, types, were planned prior to the advent of motor traffic, and for the slower, lighter, horse-drawn vehicle use. The consideration of weight, speed, safety, numbers, which now must govern design, had not yet become the controlling factors. The traffic lines are from town to town and, in general, follow through

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the most congested parts of population centers. As some of the principles which we must properly work out, the following are suggested:

(1) The development of parallel lines to divide heavy traffic through thickly populated districts.

(2) The development of direct, short mileage routes, although on these routes there may now be a less amount of improved roads than on routes now followed.

(3) The building of inner or outer belt lines around congested centers.

(4) The reconstruction of weak sections for heavy truck traffic.

(5) The widening of main routes near the largest cities or between cities where the distance is short enough to carry uniform traffic.

(6) Proper connections with the routes of adjoining states.

"Possibly there are many questions as to the future surfacing policies. The changes in types and specifications which will be sought from time to time by the bureau will be based upon the more accurate knowledge which is being obtained rapidly through research and through the detailed studies of the behavior of modern designs under traffic. The [federal-aid] requirement of the 18-foot surfacing is constructed to mean that this is fixed as the minimum 2-way road, where the construction is to be considered complete as first put down. This requirement will not preclude the building of a narrower pavement in those districts where the traffic does not yet justify the 2-way width. I am yet to be convinced that we may not properly build now in many sparsely populated districts one-half of the final width of pavement in order to complete mileage between points, if all the other work is done to provide for the full width construction later."

Pneumatic Tire Taxes Abroad

There appears to be a growing tendency in various countries to encourage the use of pneumatic tires for heavy trucks by adopting lower state taxes for this equipment than for vehicles with solid tires.

There is an example of this in the new scheme of Italian motor taxation, which came into effect on the first day of the year. Under this law the tax on a 10-horsepower motor 'bus without pneumatics is 110 lire, but this is reduced to 77 lire when air tires are fitted. For a 20-horsepower vehicle the rates are respectively 205 and 144 lire; for a 30-horsepower vehicle 305 lire without and 214 lire with pneumatic tires. For trucks the same rates are not applied, but there is still an advantage under the taxation scheme when pneumatics are used. Thus, a 20-horsepower truck pays 390 lire tax if without air tires, and 273 lire with pneumatics; for 30-horsepower the rates are 640 lire and 448 lire; for 40 horsepower the respective amounts are 990 lire and 693 lire, and for 50 horsepower the tax is 1,440 lire for solid tires and 1,008 lire with pneumatics. At the present rate of exchange 97 lire go to $5.00.

It should be pointed out that in Italy the use of pneumatics for loads of more than 2 tons is very limited. Such firms as Fiat and Lancia make 1½ and 2-tonners on pneumatics, but there do not appear to be any 3 or 4-tonners in regular production with pneumatic-tire equipment.

In Norway, too, the annual taxes are lighter when the truck is fitted with pneumatics than when solids are used. In Denmark the maximum speed is 18 kilometers an hour for solid-tired trucks and 24 kilometers an hour for those with pneumatics. Also a 3-ton truck with solid tires pays 1,050 kronen annual tax, and only 700 kronen if pneumatic tires are used.

In France the use of steel tires for motor vehicles was forbidden several years ago and, the period of transition having passed, either solids or pneumatics must now be used. In this country, however, the tax is the same whatever the nature of the tire.

Selden Motor 'Bus Units

After considerable investigation into the needs of the passenger transportation business, the Selden Truck Corporation, Rochester, N. Y., has introduced two new chassis, numbers 31 and 51.

Model 31 is rated at 2½ tons maximum, has a wheel-base of 147 inches, and a space of 14 feet 8 inches back of the dash. It is built for a body having a seating capacity of 18 passengers, with standing space for probably 18 more. Left hand drive is standard.

The motor is a special Continental, 4⅛ by 5¼ inches, equipped with a special warming device and water siphon. The transmission is in unit with the motor and has 4 forward speeds. The clutch is the multiple-disk type with 11 disks. The Seldon full-flexible frame is used, with all units flexibly mounted and having bolted construction throughout. Malleable iron wheels are standard with pneumatic cord tires, 34 by 5 front and 38 by 7 rear.

Model 51 is rated at 3½ tons maximum, has a wheel-base of 179 inches, and 17-foot 5-inch space back of the dash. It is built to carry a body having a seating capacity of 30 passengers, and will hold probably 30 more standing. Left hand drive is standard. The motor is a special Continental, 4½ by 5½ inches, equipped with a special warming device and water siphon. The transmission is mounted amidship and has 4 forward speeds. The clutch is the multiple-disk type with 13 disks. The Selden full-flexible frame is used, with all units flexibly mounted. Steel wheels are standard with pneumatic cord tires 36 by 6 front and 40 by 8 rear.

Two gear ratios are furnished in both models. Where power is needed and less speed required, a 7¾ to 1 ratio is provided, giving a speed of 18 miles per hour. The standard chassis has a 6 to 1 ratio giving a speed of 25 miles per hour.

The two models are also particularly fitted for fire protection work and intercity haulage service.

The Service Motor Truck Company announces the appointment of the Pennsylvania Motor Sales Corporation of Pittsburgh, as distributers for Service trucks in the Western Pennsylvania territory.

New U. S. Truck

The new U. S. general utility truck is offered by the U. S. Motor Truck Company as a sturdy motor truck siutable for the miscellaneous needs of lighter hauling. In its construction it has combined not only speed, but durability and dependability in use.

Brief specifications follow:

Motor—Four-cylinder, cast en bloc with removable head; bore, 3⅝ inches; stroke, 5⅛ inches; horsepower, 20¼ S.A.E.; working speed, 1,400 r.p.m.

Ignition—Generator and storage battery.

Carburetor—Float-feed.

Lubrication—Forced feed, gear oil-pump submerged.

Cooling—Centrifugal pump.

Starter—Electric with Bendix drive.

Tires—Front, 34x5-inch; rear, 34x5-inch cord pneumatic.

Wheels—Wood with Firestone patent steel felly.

Wheel-base—138 inches; loading space, 108 inches.

Chassis—Weight, 3,400 pounds; length over all, 196 inches; width over all, 70 inches; width frame, 32 inches; height ground to top of dash, 56 inches; height ground to top of cushion, 48 inches; height ground to top of cab, 90 inches; height ground to top of frame, 28 inches; length front of radiator to dash, 33¾ inches; length dash to back of seat, 47 inches; length back of seat to center rear axle, 70 inches; length back of seat to end of frame, 108 inches; width of seat, 44 inches; depth of seat, front to back, 20 inches; body weight allowance, 900 pounds.

Railroads Approve Rail Motor

(*Continued from page 35.*

better type of stream-line motor 'bus, yet it is much larger and is completely equipped with special safety devices and necessary railroad accessories. For instance, a 4-wheeled truck under the front assures stability, while the power is applied direct to the rear wheels by means of the usual type of motor truck drive-shaft. The wheel at the driver's seat is not used for steering but operates emergency brakes in addition to the regular braking system operated by compressed-air. With a special transmission of 4 speeds in each direction, the car can make an average speed of between 35 and 40 miles an hour forward or backward. This speed, coupled with the stability of the gasolene engine to accelerate rapidly when starting from a station, makes it easy to maintain steam-train schedules even under unfavorable operating conditions.

Railroad experts who have carefully watched the performance of this new rail-car have proclaimed it a "revolutionary addition to railroad equipment that will benefit both the railroads and the traveling public."

Tractors equipped with crawler-type treads and with 22-foot snow-scrapers will replace the horse-drawn scraper formerly used at a big ice plant at Blanchard, Idaho, this winter. The new tractor system, with three or four tractors, will eliminate the use of 18 or 20 teams.

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Oregon's New 'Bus Rules

New rules governing the operation of for-hire automobiles and 'buses on the highways of Oregon, have been posted by the Oregon State Public Service Commission. Under a law passed at a session of the legislature several weeks ago, this body is given control of 'bus operation throughout the state and has authority to promulgate and enforce rules governing 'bus operation and for the safety of passengers.

The new rules may be summarized as follows:

All 'buses must be kept safe and sanitary and subject to inspection at any time; every 'bus must be equipped with standard speedometer, an adequate interior light to light the entire 'bus on the inside after dark, at least one extra tire in good condition, and satisfactory brakes capable of locking the wheels instantly when at a speed of 10 miles per hour or less; drivers of 'buses must be at least 21 years of age, of good moral character and competent as drivers, and must hold state chauffeur's licenses; no driver shall smoke while operating a 'bus; no driver shall operate a 'bus for more than a maximum of 10 driving hours in any 24-hour period.

Under the new rulings all 'bus lines are operated under franchises, these franchises being granted by the public service commission upon petition, and upon the presentation of a faith bond promising continuous service the year around and in all weather. This means the elimination of the "fly-by-night" operator, who in the past has reduced the business of the all-year operator during the favorable periods. The public service commission reserves the right to revoke the franchise in case a 'bus line fails to live up to any of the rules given above or fails to provide regular and continuous service.

International Harvester Truck Plant

Work on the construction of the truck plant of the International Harvester Company, in Fort Wayne, will start on or before March 15. This is the message personally delivered by Cyrus F. McCormick, Jr., president of the company, at the annual meeting of the stockholders of the Greater Fort Wayne Development Company, which was organized to erect homes to house the workers at the plant. The contracts for the erection of the plant were made in June, 1920, but the construction work was postponed from time to time owing to business conditions.

In making his announcement, Mr. McCormick said that plans for the plant indicate that in time it will be the largest of its kind in the world, and also declared that action has been taken to make the buildings and grounds a beauty spot in the way of factory construction. Parkways, drives and landscaping of the grounds will be undertaken. The buildings will all be of stucco design.

Mr. McCormick told the stockholders of the local corporation that, while he did not want the action to be regarded as an indication of great optimism as to future business conditions in the nation, the directors of the Harvester company had decided that all pledges made should be carried out to the letter, even though a wait of a few months more for the starting of the work would be beneficial.

Much of the preliminary work in connection with the big plant has already been done. It is expected that the factory will be in operation and turning out motor trucks within a period of twelve months.

18,923 Trucks in Nebraska

Registrations for the State of Nebraska show a total of 18,923 trucks in that state last year, 322 trailers, and 219,781 passenger-cars. The following table gives the distribution of trucks and trailers by counties:

County.	Trucks.	Trailers.	County.	Trucks.	Trailers.
Adams	223	9	Johnson	84	..
Antelope	142	4	Kearney	41	7
Arthur	20	..	Keith	186	2
Banner	86	..	Keya Paha	40	1
Blaine	38	..	Kimball	234	..
Boone	197	..	Knox	274	2
Box Butte	91	..	Lancaster	1,464	24
Boyd	60	..	Lincoln	271	5
Buffalo	200	10	Logan	12	..
Brown	52	1	Loup	18	..
Burt	250	8	Madison	345	15
Butler	184	9	McPherson	36	..
Cass	216	1	Merrick	111	3
Cedar	208	..	Morrill	60	1
Chase	144	..	Nance	93	..
Cherry	82	..	Nemaha	147	..
Cheyenne	499	1	Nuckolls	84	..
Clay	103	7	Otoe	299	5
Colfax	183	..	Pawnee	117	..
Cuming	300	1	Perkins	185	..
Custer	371	8	Phelps	180	26
Dakota	117	2	Pierce	109	1
Dawes	114	1	Platte	284	..
Dawson	196	7	Polk	147	3
Duel	222	1	Red Willow	190	3
Dixon	131	..	Richardson	257	..
Dodge	506	3	Rock	45	..
Douglas	3,741	8	Saline	169	11
Dundy	120	..	Sarpy	208	..
Fillmore	92	13	Saunders	179	1
Franklin	96	7	Scotts Bluff	203	1
Frontier	121	2	Seward	193	18
Furnas	153	5	Sheridan	108	1
Gage	296	9	Sherman	40	..
Garden	112	..	Sioux	56	..
Garfield	16	..	Stanton	155	..
Gosper	65	2	Thayer	129	12
Grant	20	..	Thomas	19	..
Greeley	37	1	Thurston	110	..
Hall	414	3	Valley	86	..
Hamilton	115	16	Washington	274	3
Harlan	88	10	Wayne	318	..
Hayes	127	..	Webster	79	..
Hitchcock	112	1	Wheeler	54	..
Holt	115	..	York	185	22
Hooker	26	..			
Howard	75	..	Totals	18,923	322
Jefferson	167	5			

Republic Truck Situation

The bankers' committee, headed by Charles N. Gilbert, vice-president of First National Bank of Chicago, has taken a hand in the Republic Motor Truck Company's affairs with a view to working out a reorganization plan which will put the company in a sound financial condition. Several meetings have been held and an announcement is expected soon. The company announced late in November that it had completed arrangements for deposits and extensions of $500,000 7 per cent first mortgage notes matured, out of a total issue of $2,500,000, and a voting trust committee was formed with whom preferred and common stockholders were asked to deposit their holdings. Its plan contemplated a five-year extension of the entire amount, with the rate increased to 8 per cent. The company to redeem $300,000 annually, starting November 1, 1923, depositing noteholders having privilege of purchasing common stock at 8 to the extent of ten shares for each $1,000 note. Approximately 70 per cent of the notes have been deposited to date, and bankers are endeavoring to secure the remainder.

Heavy Trucks Again Permitted

A rescinding of a recent order handed down by the Washington State Highway Commission barring all logging trucks from the hard-surfaced highways of the state until June, 1922, has been obtained through efforts of the state executive committee of the Washington Automotive Trade Association. Throughout the timbered Northwest the lumber industry has solved its transportation problems by the use of heavy logging trucks and trailers, which have in many instances damaged or even ruined pavements, usually because the roads were not properly constructed for heavy traffic rather than because the trucks were overloaded.

The commission was shown that, through its order, trucks totaling hundreds of thousands of dollars would revert to the hands of the dealers, that industry would be stifled and that many men would be thrown out of work, further aggravating the problem of the unemployed. The association conceded that the operators had made mistakes and that the law governing excess weights had been violated, but pointed out that the proposed action was too stringent. After much deliberation it was agreed to allow logging trucks to operate, on the condition that permits be obtained from the State Highway Commission, under the direct control of which they would thereby be placed in case overloading occurred.

Convertible 'Bus Body

A novel type of 'bus body has been adopted by the Toronto Transportation Commission. Probably the most interesting detail is the fact that the body can be converted from a single-decked vehicle to a double-decker or *vice versa* within an hour. As a single-decked body there is seating accommodation for 29 passengers, and as a double-decker for 27 inside and 27 outside. As the 'bus is of the "pay-as-you-enter" type, the stairs to the upper deck have been arranged inside the body, just behind the driver's seat. When used as a single-decker the stairway is removed—so giving room for two additional seats—and the hatchway is closed with a trapdoor. The driver sits on the left-hand side, and controls the opening and closing of folding doors provided on the right side near the front by means of a lever conveniently placed so that he does not have to leave his seat. There is also an emergency door at the back.

The interior seats are upholstered in velvet, while those outside are of the usual garden slatted type. Adequate ventilation is provided, and all the side windows of the vehicle can be opened to any position required.

The total value of horses, mules, asses and burros in the country ten years ago was $2,622,180,170 against their value of $1,569,570,146 in January, 1920. This shows, more than numbers can, how these animals are steadily losing place in an economic way. While the disparity of numbers is not impressively great, their value in dollars and cents indicates that slowly but surely machines are taking the place of animal flesh and blood in the cities and fields of America.

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Kelly-Springfield Tire

The Kelly-Springfield Tire Company has issued its annual report for the year ended December 31, 1921, showing a net loss, after charges and taxes, of $506,960. This compares with a surplus of $1,959,293 in the previous year.

The income account for the year 1921 compares as follows:

	1921.	1920.	1919.	1918.
Gross profits	‡$6,004,521	$7,721,901	$7,034,284	$7,187,834
Operating expenses	4,567,427	4,290,986	3,776,735	2,598,069
Profit	$1,437,094	$3,430,915	$3,257,549	$4,589,765
Other income	445,915	604,530	274,539	.....
Total profit	$1,883,009	$4,035,445	$3,532,088	$4,589,765
Interest	2,389,969	1,492,774	137,233	136,390
Prof. share	.....	83,378	158,068	88,148
Inv. adj.	.....	500,000	.....	.....
Federal taxes	.....	.....	814,275	2,657,492
Net loss	$ 506,960	*$1,959,293	*$2,422,522	*$1,707,735
6% preferred dividends	190,776	194,226	199,026	205,959
8% preferred dividends	459,416	468,816	117,204	.....
Common dividends	322,776	†895,751	†800,409	785,152
Surplus	$1,479,928	$$ 400,500	$1,305,883	$ 716,624

*Net income. †Does not include $1,011,761 dividends paid in stock in 1921; $671,813 in 1920, and $454,778 in 1918. ‡After crediting previous reserve of $500,000 for inventory fluctuations. §Before Federal taxes.

The balance sheet of the Kelly-Springfield Tire Company as of December 31, 1921, compares as follows:

ASSETS.

	1921.	1920.	1919.	1918.
Cash	$ 2,357,977	$ 2,182,089	$ 1,679,946	$ 1,392,729
Accounts and notes receivable	2,891,999	2,439,770	2,034,029	1,467,296
Capital stock sub.	.....	9,950	.....	.....
Inventories	5,525,739	9,751,388	7,073,643	5,945,417
Deferred charges	773,539	234,390	55,871	37,884
Liberty Bonds	.....	.....	1,438,030	596,793
Sundry inv.	27,947	152,946	69,500	.....
Plant, good will, etc.	22,995,665	21,248,649	11,357,102	9,665,678
*Stock purchased	1,210,979	274,752	87,908	42,198
Total	$35,783,845	$36,293,942	$23,796,029	$19,147,995

LIABILITIES.

Preferred stock, 8%	$ 5,625,200	$ 5,860,200	$ 5,860,200	.....
Preferred stock, 6%	3,137,100	3,237,100	3,237,100	$ 3,407,100
Common stock	9,096,003	8,084,242	5,361,978	4,907,200
Gold notes	10,000,000	.....	.....	.....
Notes payable	.....	8,155,000	.....	500,000
Accounts payable, etc.	391,992	217,412	351,652	221,815
Tax pay roll, etc.	324,546	219,032	268,789	158,486
Preferred dividends, payable	47,057	48,556	49,757	51,106
Accrued interest	100,000	.....	.....	.....
Construction account, payable	.....	346,490	.....	.....
Reserves	89,070	510,535	.....	.....
Deferred credit	.....	250,000	25,000	88,149
Surplus	6,972,877	9,365,375	8,641,553	9,814,139
Total	$35,783,845	$36,293,942	$23,796,029	$19,147,995

*For resale to employees.

In his remarks to stockholders, A. B. Jones, president, says in part:

"During the early months of 1921 the company, in common with the entire rubber industry, suffered a severe depression in volume of sales and production was correspondingly reduced. As the season advanced demand substantially increased. The values of sales declined somewhat under the previous year as a result of the drastic reduction in tire prices, yet there was an increase of more than 20 per cent in volume of units sold, being the largest in the history of the company.

"Extraordinary charges were occasioned by further decline in market values of materials and finished goods and the expenses incident to operation of the new plant at Cumberland, all of which expense has been charged directly against the year's operations.

"Operations at the Cumberland plant were begun in May, 1921, and at the close of the year output had developed to a very substantial volume. Volume of output has now reached sufficient quantity to warrant belief that no further provision for extraordinary operating charges will be necessary. Operations at plants at Wooster, Ohio, and Buffalo, New York, were discontinued during the year and production heretofore obtained from these plants has been transferred to Cumberland. Both Cumberland and Akron plants are operating at maximum schedule.

Inventories show a very substantial reduction. Values of materials on hand and forward commitments at the close of the year have been based on costs which are below market value."

School 'Buses in Kansas

The Holcomb Consolidated School of Kansas claims to have the largest organization of its kind in the country. Its district is 18 miles long and 10 miles wide and contains 125 square miles of territory. Four hundred and fifty-one pupils are transported to and from their homes by a fleet of 13 modern motor 'buses that cost $1,850.00 apiece. Each 'bus holds from 30 to 40 children. The machines are driven by women teachers, who receive $20.00 a month for the work in addition to their regular salary as teachers. The longest ride made by any pupil is 12 miles; the average is 6. The longest time any pupil is in a 'bus is 45 minutes; the average is 30. The 'buses are kept in a $4,500 brick garage, and they are looked after by a mechanic who is paid $150 a month. The cost of transportation, including garage expense, averages 13 cents a day for each pupil.

International Motor Company

The International Motor Company's 1921 net earnings, after charges and taxes, did not cover approximately $1,137,000 dividends on both preferred issues. Nevertheless, that something was earned on the preferred in a poor year in the motor truck industry, officials regard as a satisfactory performance. The statement covering 1921 operations may be delayed two months by completion of inventories.

Sales of the company, including parts, last year approximated $25,000,000, compared with approximately $34,000,000 in 1920, $22,143,699 in 1919, $19,284,338 in 1918, and $11,716,874 in 1917.

There will be no necessity for inventory adjustment this year and the cost of operation will be low; hence officials say there is reason to expect that net earnings will more than cover preferred dividends. It is also expected that sales will total more than $25,000,000. Since the company is well intrenched with cash and liquid assets, no change is looked for in the preferred dividends.

Production in 1921 was around 67 per cent of the best previous year in the company's history. New business booked in January and February of last year was small. A revival came in March but earnings in the first quarter did not cover preferred dividends. Business showed a healthy improvement in the second quarter. Profits in the six months ended June 30 did not cover dividends on the major issues, but they demonstrated that the corporation had made a good showing in the first half of a year which was poor for many concerns.

Business fell off in the last half of 1921. The company ended the year with $18,000,000 working capital, including $3,500,000 cash. Inventories up to the third quarter had been reduced $3,000,000 to $12,000,000. The final statement for 1921 may show them less by another $3,000,000. The company has no funded debt and does not owe a dollar to the banks.

Truck Draws 46 Tons

An unusual haulage feat in Omaha, Nebraska, recently tested the ability of the motor truck. J. J. Hanighen frequently calls upon F. L. Busche, haulage contractor of Omaha, to move an excavating machine which weighs 46 tons. Formerly the combined pull of three heavy-duty trucks was required to tow the ponderous machine. On the most recent occasion, however, Mr. Busche decided to test the power of his new 5-ton Pierce-Arrow.

Working alone, the new unit towed the 46-ton apparatus a distance of 5 miles. The truck, with its enormous load, even climbed the 7 per cent grade at 30th and Harney Streets without assistance. In the middle of the ascent the truck and its tow were stopped for the purpose of taking photographs. In starting again the engine slipped the driving wheels a half-turn on the dry asphalt before they gained sufficient traction to overcome the inertia of the dead load.

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62-Passenger English 'Bus

With the advent of the new Leyland O. P., or overtype chassis in England, a 'bus to carry no less than 62 passengers is making its appearance.

The design of the chassis with the driver over the engine, offers considerably greater length for the body, without involving undue overall length. On a wheelbase of 14 feet 4½ inches, the length overall from starting crank to back stairway is but 27 ft. 3 inches. The body, which is, of course, double-decked, carrier 28 passengers inside, 34 on the top. Inside the available length is 16 ft. 9 inches, and the seats are arranged somewhat similarly to those in the latest London General Omnibus Company's vehicles, except for a seat across the front accommodating passengers with their back to the driver. On top the usual arrangement of double seats is followed, 8 along the off side, 9 on the near, and access to these is obtained by the usual stairway from the conductor's platform. The large outside accommodation is rendered possible by carrying the roof forward over the engine and driver's seat, where it is supported by the pillars of the driver's compartment, which can be entirely inclosed Only wood paneling is employed, and the interior is finished in mahogany and ash with a roof of 3-ply maple. In maximum height the body reaches 12 feet 5 inches, and the width over pillars is but 7 feet.

From the 40-48 horsepower engine a 12-volt lighting equipment is driven. A feature of the chassis is found in the auxiliary coil springs which take up the weight when running light.

New Denby Directors

The annual meeting of the Denby Motor Truck Company was held at the company's plant in Detroit on February 15th. The same management was continued in office and the following directors were elected: E. R. Ailes, treasurer, Detroit Steel Products Company, Detroit; Hon. Edwin Denby, Washington, D. C.; J. Walter Drake, chairman, Hupp Motor Car Corporation, Detroit C. H. L. Flinterman, vice-president, Detroit Pressed Steel Company, Detroit; H. L. Lyster, attorney, Detroit; A. S. Moore, president, Denby Motor Truck Company, Detroit; T. M. Simpson, assistant secretary, Continental Motors Corporation, Detroit.

Even though 1921 was an extremely dull year in the truck industry, the Denby company is now in a better financial position than a year ago with all inventories charged down to current replacement values. A decided improvement in truck buying is indicated for 1922; in fact the Denby company has received as many truck orders for the first weeks of this year as came in during the first three months of 1921. The demand is especially good on the ¾-ton and the 1½-ton trucks. A new model 35, 2½-ton truck has recently been added to the Denby line and sales on this new model are already very promising.

Registrations in southern California show a considerable increase for 1921 over the preceding year. Among motor wagons and trucks the Fords stood first in number, Dodges came second with 521, and Macks third with 276.

U. S. Tire Profits $470,817

In submitting a preliminary report of the condition of the United States Rubber Company to its stockholders, C. B. Seger, chairman of the board of directors, said in part:

"As indicated by the balance sheet, the company closed the year in a strong financial condition. substantial liquidation having been effected, overhead expenses having been reduced to the minimum consistent with efficient operations, and with inventories of finished goods substantially reduced and adjusted on a basis of sound values, and inventories of raw materials and supplies, including forward commitments, on the basis of current requirements, at market prices or lower, the company is in a strong financial and trade position to meet the future. The results for the future depend entirely upon general business conditions.

"The net sales for the year amounted to $164,470,368, being a decrease of $91,679,762, or 35.79 per cent. compared with the sales for 1920, which were the largest in the history of the company. After absorbing approximately $10,000,000, representing the excess cost of finished goods carried over from 1920 and sold in 1921 as compared with the average cost of producing similar goods in 1921, but before the adjustment of inventories, all of which adjustment is definitely allocated to 1920 as hereinafter explained, the net profits for the year amounted to $470,817 after all interest and other current charges, notwithstanding a reduction of approximately $18,000,000 in the income from sales, caused by the drastic trade reductions in selling prices made after January 1, 1921. Total inventories as of December 31, 1921, amounted to $76,691,777, as compared with $123,503,030 as of the first of the year, a reduction of $46,811,253, or 37.90 per cent. Approximately 66 per cent. of all the finished goods on hand as of December 31, 1921, was located at the company's sales branches.

Liabilities were decreased $23,200,000, of which $13,195,000 was in notes payable, $8,930,000 in accounts and acceptances payable and accrued liabilities, including federal taxes and dividend provisions, and $1,075,000 in bonds and notes retired. Current assets as of December 31, 1921, amounted to $134,766,062 after writing down inventories and after deducting from accounts receivable an amount considered adequate to cover doubtful accounts. Inventories of raw materials and supplies, including crude rubber as of December 31, 1921, were valued at or below market prices. Inventories of finished goods were carried at the average cost of production, which will produce satisfactory net profits on the basis of prevailing selling prices. Current liabilities as of December, 1921, amounted to $49,232,561. All accounts were met during the year as they fell due, and full advantage was taken of all cash discounts."

The preliminary consolidated balance sheet as of December 31, 1921, of the United States Rubber Company and subsidiary companies follows:

Assets.		
Cash	$13,816,477	
Accounts receivable	41,543,883	
Notes and loans receivable	2,713,925	
Finished goods	51,248,659	
Material and supplies, including goods in process	25,443,118	
Total current assets		$134,766,062
Notes receivable of employees given for purchase of common stock and secured by such stock	$ 7,129,454	
Common stock of U. S. R. Co. held under Service Contracts and Agreements	2,305,336	
Securities owned and held in Insurance Fund	2,442,032	
Securities owned, including common stock of U. S. R. Co. held by a subsidiary company	4,321,969	
Plants, properties and investments including rubber plantations	185,980,377	
Prepaid and deferred assets	4,126,168	
		206,305,336
Total assets		$341,071,398
Liabilities, Reserves and Capital.		
Accounts payable, including acceptances payable for importation of crude rubber	$ 9,517,220	
Accrued liabilities	3,505,341	
Notes payable	36,210,000	
Total current liabilities		$ 49,232,561
U. S. R. Co., First and Refunding Mortgage Gold Bonds due 1947 ($66,551,800 5% and $24,750,000 6%)	$91,301,800	
less Treasury Bonds deposited as security for:		
U. S. R. Co. 5 yr. 7% Secured Gold Notes	$ 9,000,000	
U. S. R. Co. 10 yr. 7½% Secured Gold Notes	24,750,000 33,750,000	57,551,800
U. S. R. Co. 5 yr. 7% Secured Gold Notes, due Dec. 1, 1923	6,000,000	
U. S. R. Co. 10 yr. 7½% Secured Gold Notes, due Aug. 1, 1930	19,800,000	
Canadian Consolidated R. Co., Ltd., 6% Gold Bonds, due 1946	2,600,000	
		85,951,800
Total liabilities		$135,184,361
Reserve for depreciation of property and plant	16,753,482	
Reserves for insurance	2,975,980	
Reserve for federal taxes and other contingent payments	1,649,667	
Reserve for dividend on preferred stock, payable Jan. 31, 1922	1,380,000	
Total reserves		22,759,129
Capital stock—Preferred	69,000,000	
Less amount held by a subsidiary company	3,890,000	65,110,000
Capital stock—Common	81,000,000	
Minority—Canadian Cons. Rubber Co., Ltd., stock	277,000	
Total capital stock	146,387,000	
Fixed surpluses—Subsidiary companies	6,709,275	
Surplus	30,031,633	
Total capital stock and surpluses		183,127,908
Total liabilities, reserves and capital		$341,071,398

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Smith Wheels hold their supremacy, now as before. They were in the front ranks of war in ever increasing numbers. This gave them a perfect score. In peace their results are the same.

Smith Wheels have always been of the same design, manner of making, and material used. Why? Because their performance could not be bettered.

Today there are more Smith Wheels made and sold than all other makes of metal truck wheels combined. They dominate the highways.

Although superior in appearance and quality to all others, and although their price is now less than their pre-war price, their performance, and nothing else, is what sells them.

The Rigid Type and Cushion Type of Smith Wheels vanquish all comers. Each performs perfectly its allotted duties in their respective fields. The Cushion Type rides like a pneumatic.

If dealer, write us for Agents proposition.
If Truck user, write for particulars.
Truck Maker knows.

SMITH WHEEL
SYRACUSE N.Y. U.S.A.

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Goodrich 1921 Business

The annual report of the B. F. Goodrich Company for the year ended December 31, 1921, shows, after crediting income with a reserve of $10,000,000 from December 31, 1920, for contingencies and losses, a net loss of $8,983,401. This is after charging out interest, depreciaton, and a reserve of $3,316,117 set up at the end of 1921 to reduce raw material commitments for future delivery to approximate market values on that date. In 1920 the company reported net profit of $921,248.

The income account of the company and subsidiaries for the year 1921, compares as follows:

	1921.	1920.	1919.	1918.
Net sales	$86,687,339	$150,007,345	$141,343,419	$123,470,187
Additional reserve¶	10,000,000	.....	.....	.....
Total	$96,687,339	$150,007,345	$141,343,419	$123,470,187
Manufacturing expense, etc.	96,764,009	142,250,719	121,579,265	102,156,330
Loss	$ 76,670	†$ 7,756,626	†$ 19,764,154	†$ 21,313,857
Other income	1,112,056	976,346	576,060	296,465
Total income	$ 1,035,386	$ 8,732,972	$ 20,340,214	$ 21,610,322
Depreciatian	1,956,445	1,939,760	1,835,540	2,428,226
Plant reserve	.....	.....	.....	1,447,540
Interest, etc.	4,746,225	4,081,926	1,199,861	2,097,442
Exchange loss	.....	1,790,038	.....	.....
Reserve‖	3,316,117	.....	.....	.....
Net loss	$ 8,983,401	†$ 921,248	†$ 17,304,813	†$ 15,637,114
Preferred dividends	2,626,470	2,688,840	2,247,000	1,785,000
Common dividends	902,100	3,604,200	2,400,000	2,400,000
Deficit	$12,511,971	$ 5,371,792	*$ 12,657,813	*$ 11,452,114
Previous surplus	22,706,498	41,203,046	33,894,923	20,177,379
Preferred stock bought	.....	45.775	.....	.....
Premium and accrued dividends	.....	.....	387,000	.....
Total surplus	$10,194,527	$ 35,877,029	$ 46,939,736	$ 31,629,493
Deduct	.....	100,000	177,778	1,009,506
Federal taxes‡	.....	3,057,627	5,558,912	.....
Cost of notes	.....	2,012.904	.....	.....
Reserve for loss	.....	§8,000,000	.....	.....
Earned surplus	$10,194,527	$ 22,706,498	$ 41,203,046	$ 30,619,987

*Surplus. †Profit. ‡Federal taxes for previous year. §Reserve for approximate losses on new material. ¶Reserve at December 31, 1920, for contingencies and approximate losses on raw material commitments for future delivery. ‖Reserve at December 31, 1921, to reduce raw material commitments for future delivery to approximate market values on that date.

The consolidated balance sheet of the company and subsidiaries as of December 31, 1921, compares as follows:

ASSETS.

	1921.	1920.	1919.	1918.
Real estate, plant, etc.	$32,115,759	$ 32,828,063	$ 19,486,065	$ 17,061,586
Good will, patents	.....	.....	57,798,001	57,798,001
Inv., other costs	4,446,546	6,153,214	9,385,812	5,206,363
Treasury stock	230,600	1,418,600	1,906,600	930,700
Inventory	29,618,936	72,631,058	54,184,975	34,965,692
Accounts and notes receivable	19,408,519	20,676,141	23,561,752	12,570,609
Bills receivable	.....	1,071,127	44,688	130,796
Liberty Bonds, etc.	43,266	44,918	2,591,535	5,784,656
Cash	2,573,696	3,068,315	5,491,500	6,343,766
Deferred charges	593,907	1,028,676	1,264,990	446,258
Total	$89,031,229	$138,910,112	$175,715,918	$141,238,427

LIABILITIES.

Preferred stock	$27,224,000	$ 38,412,000	$ 39,600,000	$ 25,500,000
Common stock	‡2,313,999	2,313,999	60,000,000	60,000,000
Emp. stock sub.	536,963	303,466	.....	.....
Bills payable	.....	29,122,956	24,068,000	.....
Accounts payable	1,952,489	2,580,237	5,864,069	1,248,032
Accrued liabilities	1,460.639	1,461,331	1,255,739	522,868
Notes	30,000,000	30,000,000	.....	15,000.000
Reserves	†4,123,548	12.009,624	3,725,064	3,847,540
Appropriated for preferred stock	.....	.....	.....	4,500,000
*Surplus	11,419,591	22,706,499	41,203,046	30,619,987
Total	$89,031,229	$138,910,112	$175,715,918	$141,238,427

*Before federal taxes. †Comprises reserves for aproximate losses on raw material commitments for future delivery of $3,316.118, pensions $600,000, and miscellaneous of $207,-430. ‡Represented by 601.400 shares of no par value, and is after exclusion of intangible capital assets, namely, patents, trade marks and good will, amounting to $57,798,001.

In his remarks to stockholders B. G. Work, president, says in part:

"Practically the entire loss sustained in 1921 is due to the decline in market values of raw materials and finished goods carried forward from the preceding year. It is the opinion of the directors that with the substantial reductions effected in operating costs during past year the current year's operations should, with a reasonable volume of business, show a fair margin of profit. In spite of the fact that during the past year capital expenditures have been kept down to a minimum outlay, company's plants are in excellent condition to take care of a much larger volume of business than represented by 1921 sales."

Motor Fuel Consumption

Gasolene consumption in eleven states of this country increased 9.1 per cent in 1921 over 1920. Figures are available because they have oil inspection departments which compile the amount of gasolene sold. The total consumption in these eleven states last year was 630,760,568 gallons compared with 577,888,360 gallons for 1920, an increase of 52,872,208 gallons.

While the combined consumption in these eleven states showed this gain over 1920, four of the states showed decline in gasolene consumption compared with 1920. These were Alabama, Georgia, North Dakota and South Carolina.

Below is a table comparing 1921 consumption in the eleven states with 1920, all states except South Dakota covering the fiscal year ended December 31. South Dakota's fiscal year ends June 30. Figures were compiled by American Petroleum Institute from official sources, although in a few instances December consumption is estimated:

	1921. (Gallons.)	1920. (Gallons.)
Alabama	41,453,020	48,000,000
Arkansas	32,068,457	28,590,837
Colorado	59,987,322	51,338,591
Florida	61,487,348	52,772,082
Georgia	*78,495,855	82,221,857
Nebraska	91,973,560	82,361,400
North Dakota	*39,866,393	42,178,802
Oklahoma	89,209,620	62,991,167
Oregon	*50,845,228	44,975,232
South Carolina	36,735,715	41,458,392
South Dakota	48,638,050	41,000,000
	630,760,568	577,888,360
Increase 1921 over 1920.	52,872,208	.....

*December estimated.

Figures from seven states, Arkansas, Colorado, Florida, Georgia, Nebraska, North Dakota and South Carolina, show 1921 consumption of kerosene of 120,221,913 gallons contrasted with 129,229,330 gallons for the same states in 1920, a decrease of 9,007,417 gallons, or 7 per cent. Consumption for Georgia and North Dakota included estimate for December.

Jamaica May Limit Weight

It is reported that the Director of Public Works, the official in charge of the construction and maintenance of the main roads of the island of Jamaica, has suggested the enactment of a law to provide that motor trucks hereafter imported into the island shall not exceed 7,500 pounds in weight, and the engine shall be governed so as not to allow a speed of more than 10 miles per hour. Trucks considerably in excess of this weight traveling at a greater rate of speed are at present in use in the island, and it is maintained by the Department of Public Works that the roads have not been constructed to withstand such heavy vehicles passing over them and that, in consequence, many of them have been considerably damaged.

Motor Transport in Bermuda

A majority in the Bermuda House of Assembly has been won over to the plan that will give the Colony motor transport service throughout the island, under government control and possibly under private ownership. The plan is to use the lighter style of motor 'buses, with a capacity of about 24 persons, and also freight trucks of about the same size; no other type of vehicles may be used in this service. The leading horse transport firm is selling out its entire outfit, which may be taken as an indication that the same firm will be in the running for the new method of transport, and that by the end of 1922 Bermuda will have a controlled motor service.

Highway officials of the states of Illinois, Michigan, Minnesota, Iowa, Kansas, Wisconsin, South Dakota and Missouri at a recent conference in Chicago pledged that they would let no further contracts for concrete roads until the cement manufacturers lowered the price of cement.

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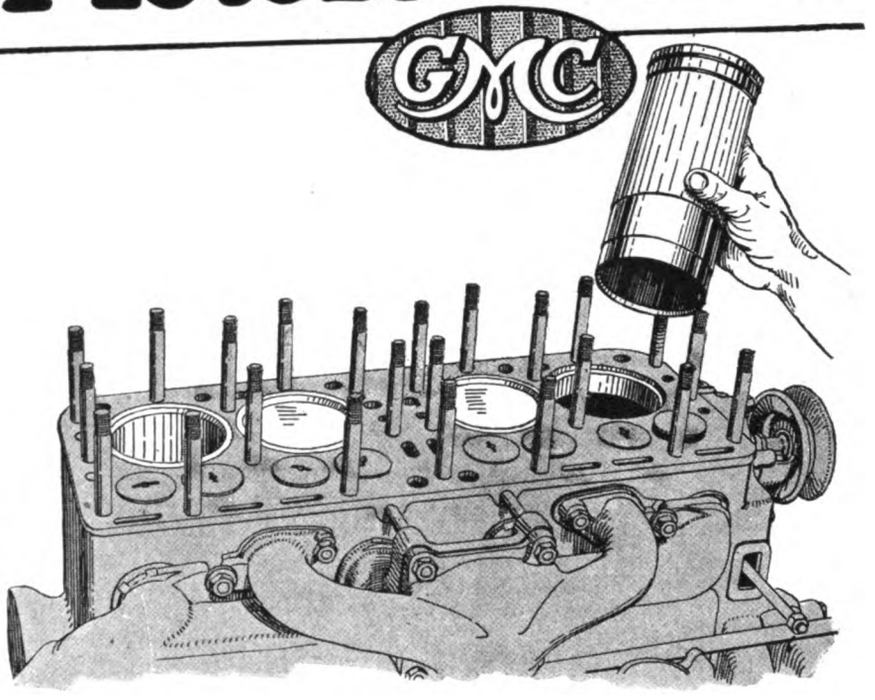
General Motors Trucks

Each GMC Cylinder Is a Separate Sleeve

It can be removed and replaced in a few hours saving the usual heavy expense of taking out the entire cylinder block



Motor truck users are looking for more than the unquestioned evidence of skilled engineering and precise manufacture in the truck they select today. For they appreciate as never before that mechanical accessibility is equally important to economical, uninterrupted performance.

A truck which must be laid up for perhaps days, with lost revenue and several hundred dollars worth of labor expended to replace or readjust a minor part, is an expensive proposition to own regardless of how well it operates.

This is one of the many reasons for the growing preference among wise motor truck users for the GMC. The GMC engine was designed exclusively for motor truck usage with full appreciation of all the essential qualities necessary for the success of such an engine under all conditions—economy of operation—surplus power—and quick accessibility for readjustment and replacement, with the consequential lowered costs for this work.

As an example of the practical accessibility of GMC construction it is possible to remove a cylinder sleeve from a GMC engine and replace it in a few hours.

It is not necessary to lay the truck up for several days or to incur the heavy repair expense that follows when the entire cylinder block must be taken from the truck and remachined, as in the case of the common type of engine.

Each cylinder in a GMC engine is a separate sleeve which is pressed into place in the cylinder block.

This is a new type of cylinder construction that not only adds to the efficiency of the engine's operation but also is most economical in cases of damaged cylinder walls.

The sleeves are machined on both sides to accurate thickness and the expansion and contraction of the walls under temperature changes, is consequently spread evenly, preventing the cylinder from becoming out of round and causing excessive wear.

Moreover this type of cylinder construction insures an absolute and continuous fit of piston rings and pistons, preventing any loss of compression as is the case of the common type of engine when cylinders become out of round.

This is only one of the many improved features of GMC construction that truck buyers everywhere appreciate because they insure more and better motor truck service at a lower cost for maintenance and operation.

Moreover the complete line of GMC trucks from one to five tons capacity has recently been reduced in price in keeping with the spirit of the times and substantial reductions also have been made upon all service parts.

Here are six other features that insure better truck service and lower operating costs—

1. ***Two-Range Transmission***—develops 30% more pulling power without sacrificing speed for hauling over good roads.
2. ***Removable Valve Lifter Assembly***—easy of access, easy to adjust, easy to replace and keep always in perfect condition.
3. ***Dual Cooling***—cool water continually circulates around firing chambers—warmer water surrounds all vaporization points.
4. ***Super Heated Carburetion***—gives greater power from present day heavy fuels and makes every drop of gas do more work.
5. ***Fly Ball Governor***—governs instantly and positively to correct speed which helps prolong the life of every GMC.
6. ***Pressure Lubrication***—this system is positive, simple and at the same time insures a wealth of oil upon all surfaces constantly.

GENERAL MOTORS TRUCK COMPANY

Division of General Motors Corporation

PONTIAC, MICH.

Branches and distributors in principal cities

Please mention "Power Wagon" when writing to advertisers.

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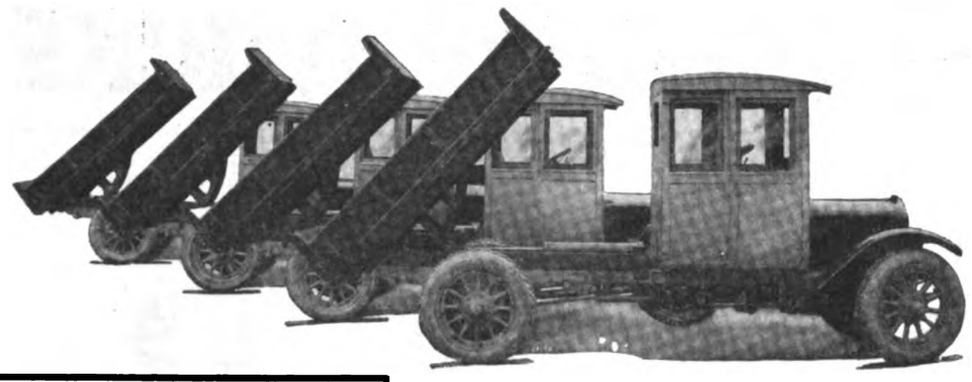

G. M. C. one-ton trucks fitted with the new Wood-Detroit Underbody Hoist. These Hoists are now being furnished in three sizes—for Ford Trucks, Speed-Wagons, and One-Ton Trucks.

The Body shown is the Convertible. As shown it is a perfect acting dumping unit. By lifting the sides off and substituting stakes and dropping the tailgate flush with the floor, a general-purpose stake body is made, for all kinds of hauling.

SALES AND SERVICE:
Boston, Mass.—3371 Washington Street
New York, N. Y.—721 E. 135th Street
Philadelphia, Pa.—3428 N. 18th Street
Pittsburgh, Pa.—2723 Liberty Avenue
Cleveland, Ohio—E. 36th St. and Cedar Avenue
Detroit, Mich.—2035 Gratiot Avenue
Richmond, Va.—510 E. Main Street
Nashville, Tenn.—211-13 Second Avenue, S.
Indianapolis, Ind.—339-41 N. Capitol Avenue
Chicago, Ill.—3751 Wentworth Avenue
Milwaukee, Wis.—2815 Dunbar Place
Minneapolis, Minn.—University at 6th St., S. E.
St. Louis, Mo.—1112 N. 9th Street
Denver, Colo.—1751 Wazee Street
Salt Lake City, Utah.—141 Pierpont Avenue
Seattle, Wash.—1106 Pine Street
Portland, Ore.—53 4th Avenue
San Francisco, Cal.—51 Minna Street
Los Angeles, Cal.—165 E. Jefferson Street
Windsor, Ont., Can.—1025 Tecumseh Road

The New Wood-Detroit Underbody

To meet the need for a light, quick-acting hoist for the new type, high-speed trucks, we have developed the Wood-Detroit Underbody. This unit mounts in the frame, under the body, so no space is wasted—the body can be full length. It is light, yet very strong. Though speedy, it is simple and dependable—a hoist that is always ready to use, yet does not interfere with the efficiency of the truck when used for general hauling.

The Wood-Detroit line of Hydraulic Hoists is complete—there is a size and type for every chassis and every load. And the line of dump bodies is correspondingly complete. In addition to the all-purpose body shown above, there are standard bodies of all lengths, and heights, in different styles, for different commodities, and special bodies for all special needs.

Wood Hydraulic Hoist & Body Co.
4196 Bellevue Ave. DETROIT

SMITH
PRESSED STEEL FRAMES

Made in the Largest and best equipped frame plant in the World

A. O. SMITH CORPORATION
MILWAUKEE
Detroit Office: 708 Ford Building

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HEIL
Bodies and Hoists

Satisfactory from Fleet Owners Standpoint

Heil equipment has been installed on fleets ranging from three to fifty trucks all over the country and everywhere it is giving genuine satisfaction.

"Not one cent for repairs and I've dumped loads under conditions one would think impossible."—"Save more time and get better results with the Heil Hoist."—"Not one minute's trouble."—"An ideal unit for general dump truck work."—"Well satisfied."—"Can be depended on." These are a few opinions from fleet owners in California, New Jersey, Minnesota and Illinois.

Upper view—Four and one-half yard three batch body and Hydro Hoist. Dumping angle 54 degrees. Lower view—Two yard two batch body showing swinging partition (patents applied for.) Double acting tail gate is standard on all Heil Bodies.

Prices on all Dump Bodies were reduced December 1st. Send for new Price List and Catalog No. 120, just published. Write for Dealers proposition.

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Being convinced that a fabric disc joint within its limitations offers certain advantages, we have supplemented our line of all-metal joints with a corresponding line of fabric disc joints and now offer them for early delivery.

The same quality of materials and excellence of workmanship which the trade attributes to our all-metal assemblies are incorporated in our fabric disc joint assemblies.

We solicit an opportunity to familiarize you with certain original features and details of our new design.

Making both lines, i. e., all-metal and fabric disc joints, you may rest assured that our recommendations will be made on the basis of *your* needs.

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Pioneer Builders of Universal Joints

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TRUCKS

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2-ton $3200 3½-ton $4350 5-ton $4850 fully equipped

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The publishers are in need of three copies of the May and June, 1920, issues of Power Wagon. Readers who have no further use for these numbers are requested to communicate with the Circulation Department, Power Wagon Publishing Company, 544 Lake Shore Drive, Chicago.

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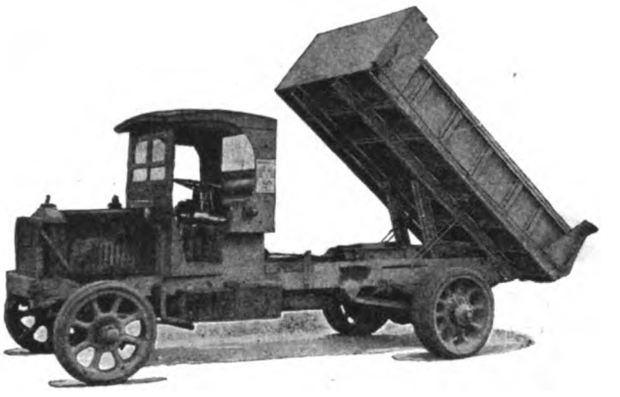

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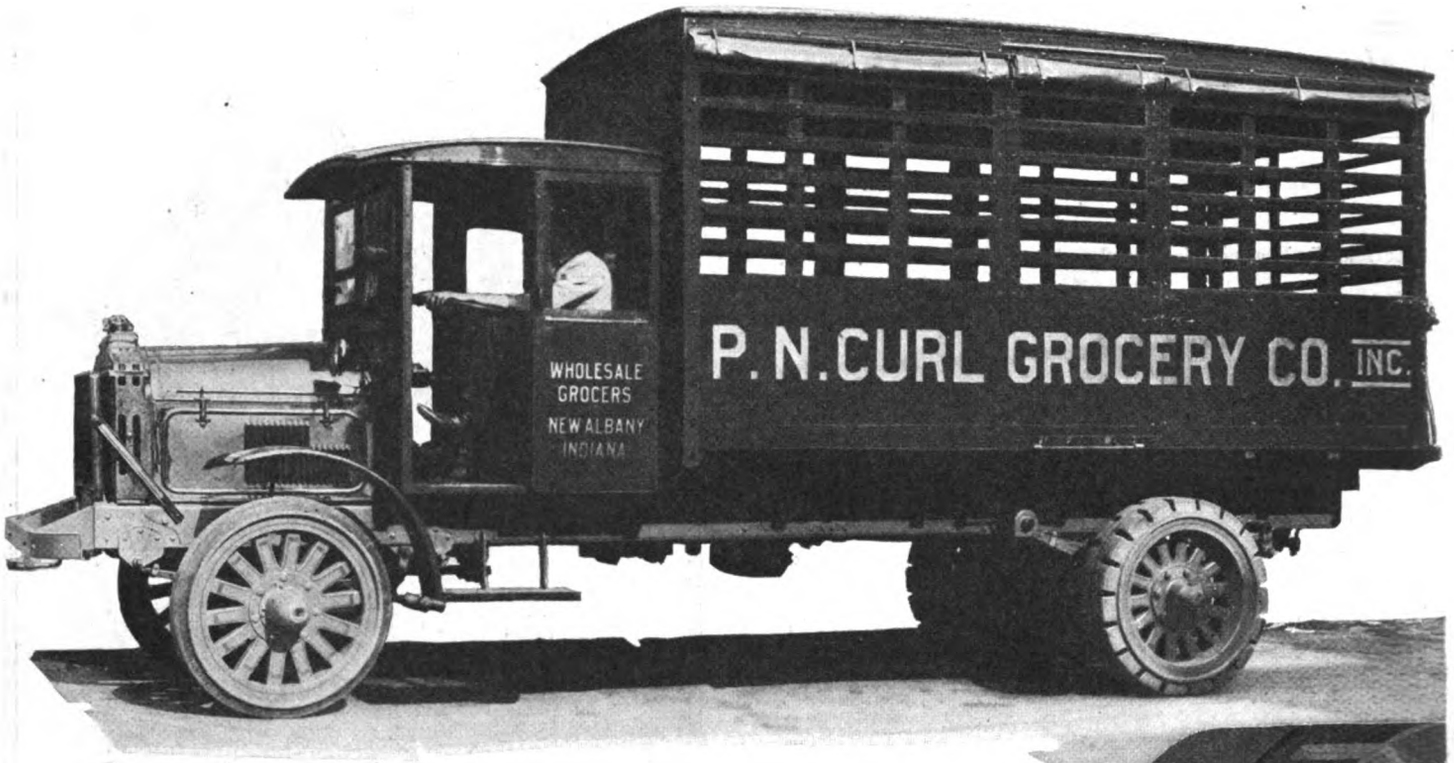

Says Kelly Caterpillars are in a class by themselves

Whenever truck tires are judged by actual service rendered, Caterpillars never fail to win the truck owner's approval. It is not unusual, therefore, for us to receive letters like the one printed below from the P. N. Curl Grocery Co., of New Albany, Indiana.

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"We have in service four large trucks, all of which are equipped with your tires.

"We have been big users of solid tires for the past five years, and have experimented with practically all of the leading tire manufacturers.

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Caterpillars are made in sizes suitable for trucks of every type and weight

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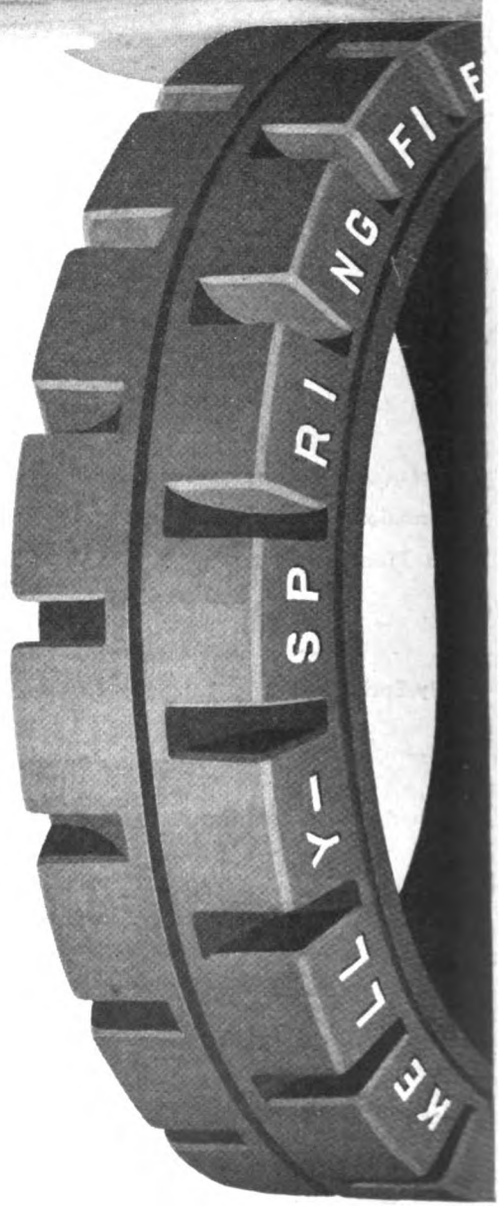

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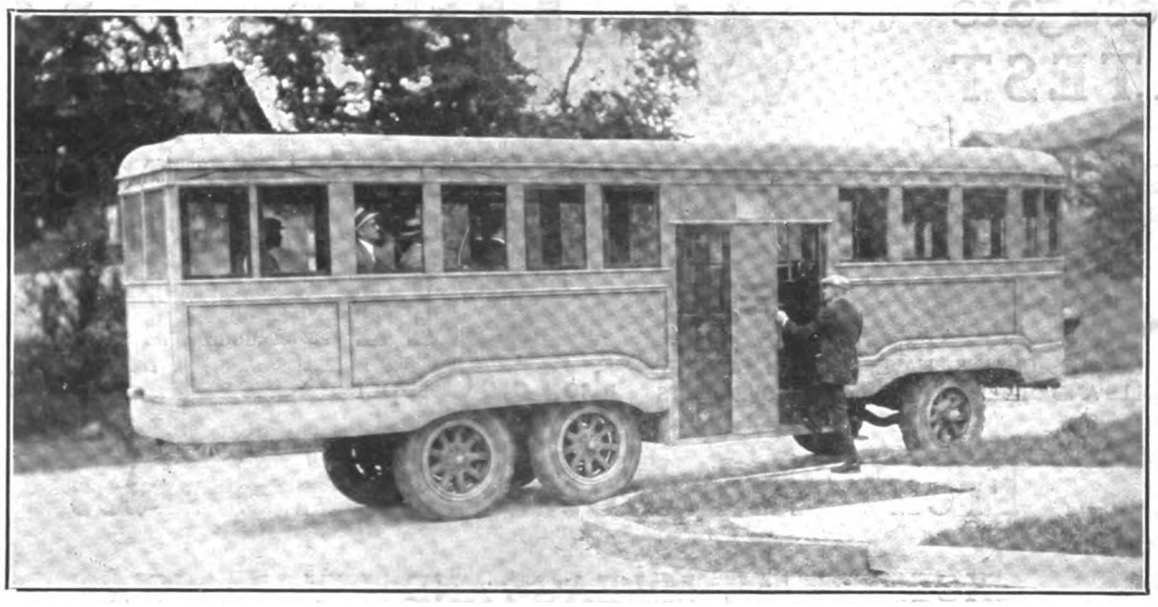

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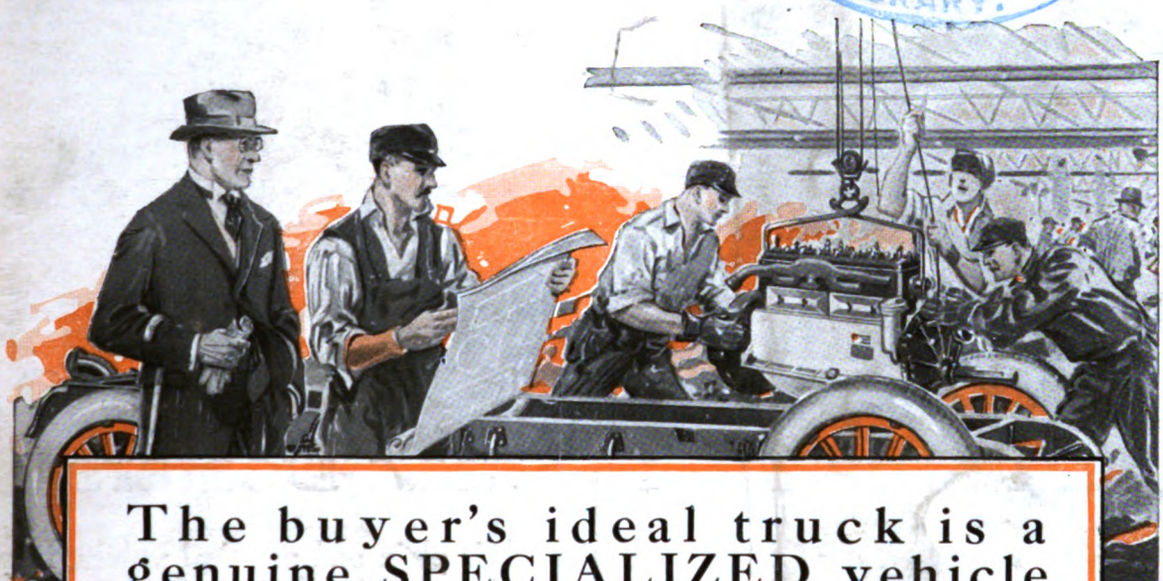

The buyer's ideal truck is a genuine SPECIALIZED vehicle

When the truck user of today visualizes the type of vehicle that *he* would choose to build for his own use, he pictures a truck constructed of masterpiece units.

Experience has taught him a definite lesson. It has convinced him that the ideal type of truck must be what a genuine SPECIALIZED vehicle is today; namely, a truck built exclusively of *proven* units—a truck guaranteed by its builder, backed by the ability of the unit SPECIALISTS and adequately protected by parts-distributing stations that dot the world.

Farsighted dealers, therefore, are identifying their organizations with high-grade SPECIALIZED vehicles. They are insuring their own futures by capitalizing the growing demand for trucks built exclusively of thoroughbred units—such units, for instance, as the motor that bears on its crankcase the foremost symbol of SPECIALIZATION—the Continental Red Seal.

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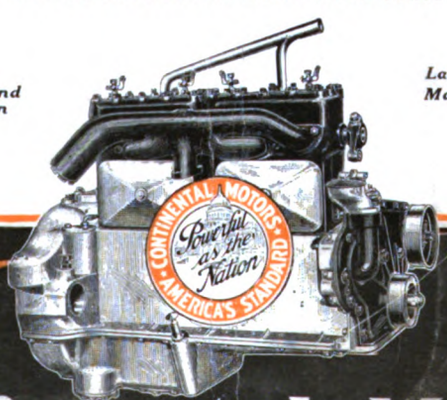

Continental Motors

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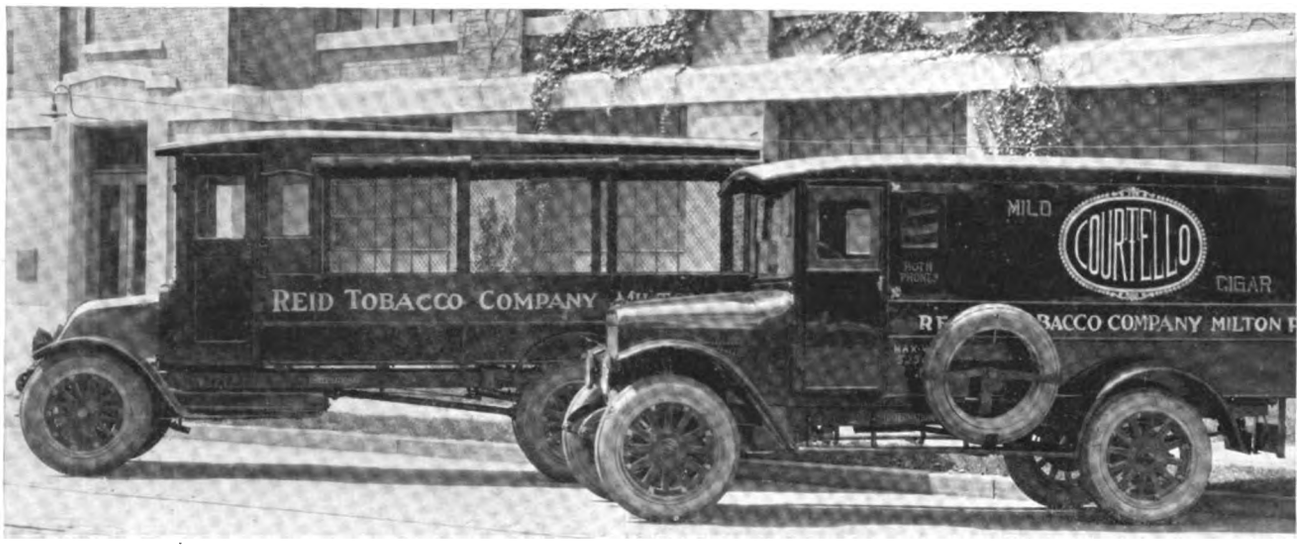

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International MOTOR TRUCKS

Sizes

Model S,	Speed Truck
Model 21,	2,000 lb.
Model 31,	3,000 lb.
Model 41,	4,000 lb.
Model 61,	6,000 lb.
Model 101,	10,000 lb.

BY reason of their plain and practical values, International Motor Trucks have become firmly established in every line of business. Ask the retailer, wholesaler, warehouseman—talk to the manufacturer—note the Internationals on the farms. In every case the owner is justly proud of his purchase and is unconsciously helping to build up good business for the International Dealer.

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Our comprehensive sales and service facilities, operated through 92 branch houses in the United States, give the International line added desirability as a dealer proposition. If you are fitted to sell and service this line of trucks properly you will do well to write today for detailed information.

INTERNATIONAL HARVESTER COMPANY
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CHICAGO U S A
92 Branch Houses in the United States

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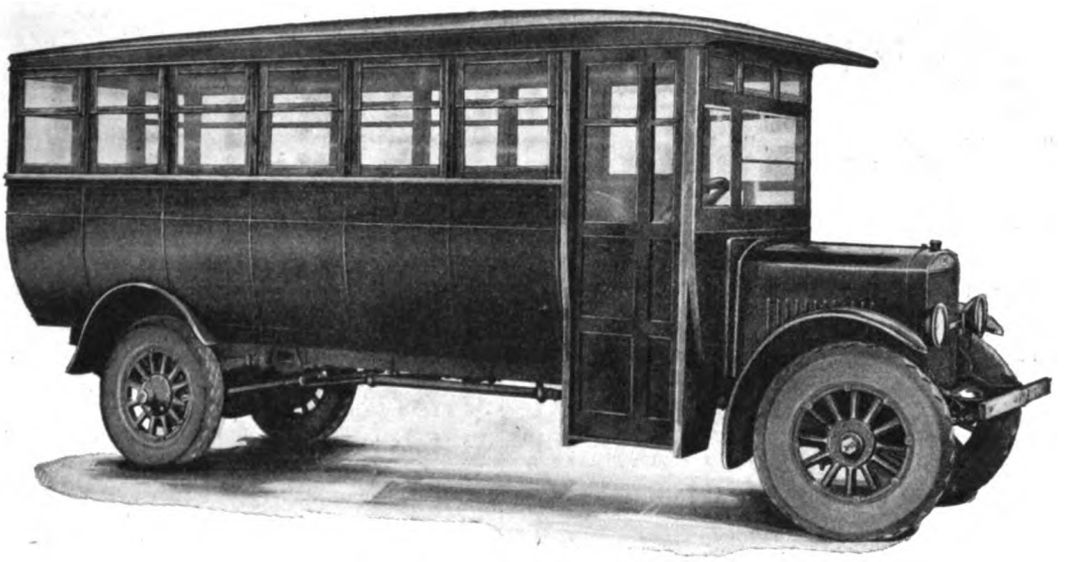
GMC

General Motors Bus



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Built particularly for passenger work, this new motorbus embodies many features of construction especially desirable in motorbus operation. Long wheelbase, long flexible springs and a frame under practically the entire body give it perfect riding qualities. Other exclusive GMC features afford marked operating and maintenance economies.

Wheelbase, 178 inches; **Road speed,** governed to 30 miles an hour; **Engine,** GMC design and manufacture, developing 40 horse power at governed speed; **Body,** wood and metal combination 205 inches long, 72 inches wide, 75 inches high inside; **Capacity,** twenty passengers; **Rear axle road clearance,** 8¾ inches; **Tires,** 36 x 6 cord (non-skid); **Springs,** semi-elliptic; front, 42" long; rear, 54" long. **Equipment**—body has two optional seating arrangements for city and interurban use. Seats rattan covered. Electric lights, starter, electric buzzer system, rear vision mirror, electric horn and complete tool equipment.

Send for special booklet giving full particulars

GENERAL MOTORS TRUCK COMPANY

Division of General Motors Corporation

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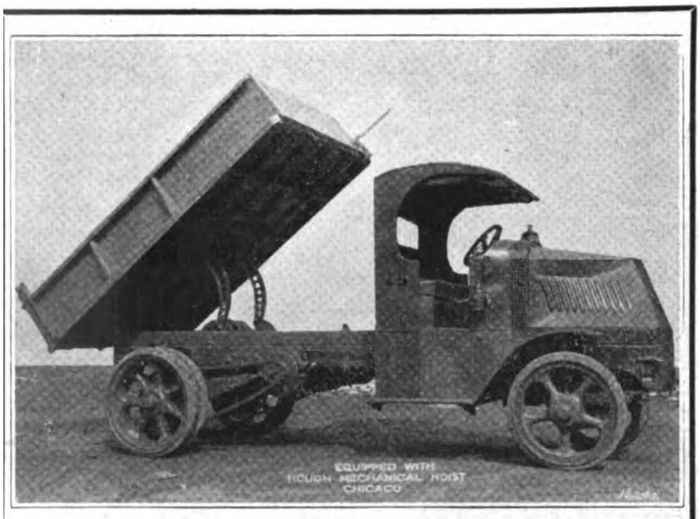
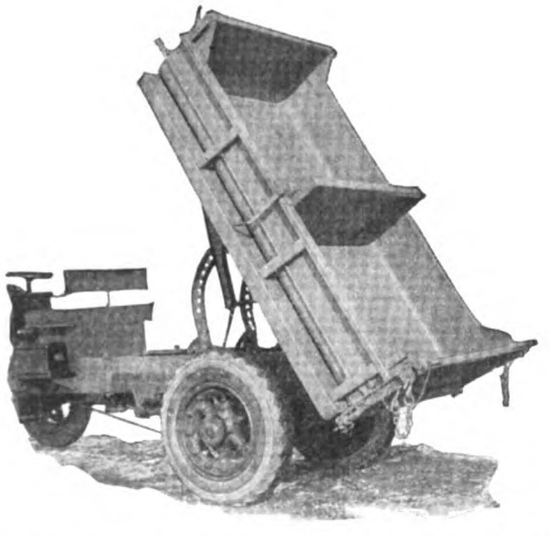


Hough Mechanical Hoist

installations become an integral part of your truck unit, carrying out the same principle of delivering the power of your motor in elevating the body through a positive gear drive identical with your own truck transmission. There being **no** oil cylinders, check valves or oil pumps. Nothing to be affected by dirt or grit, **no** valves to leak, **no** packing to become loose.

Hough Hoists boost everything but the repair man's profits.



The high dumping angle designed for road building units is an exclusive feature with Hough Hoists.

Built in three sizes, fits any make of truck.

3 Ton — 6 Ton — 10 Ton

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

Published monthly by

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544 Lake Shore Drive, Chicago, U. S. A.

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THE POWER WAGON PUBLISHING COMPANY

WALTER WARDROP, *President and General Manager*
STANLEY A. PHILLIPS, *Vice-President and Editor*

Executive and Editorial Offices, 544 Lake Shore Drive, Chicago.

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When Replacement is Necessary

Such service as that indicated by these pictures may eventually make necessary the replacement of worn gears.

When this time comes, if ever, use only genuine parts furnished by the maker of the original. This is the only safe rule to follow in all cases of trouble regardless of the unit affected.

When gears are to be replaced, extreme care must be exercised by the mechanic if proper results are to be obtained. Write for "Instructions for Adjusting Differential Gear and Pinion", invaluable to the axle repair man.

Genuine bevel drive gears are identified by our trade name on each gear. These can be obtained through car dealers or their appointed service stations.

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Both at Syracuse N.Y.

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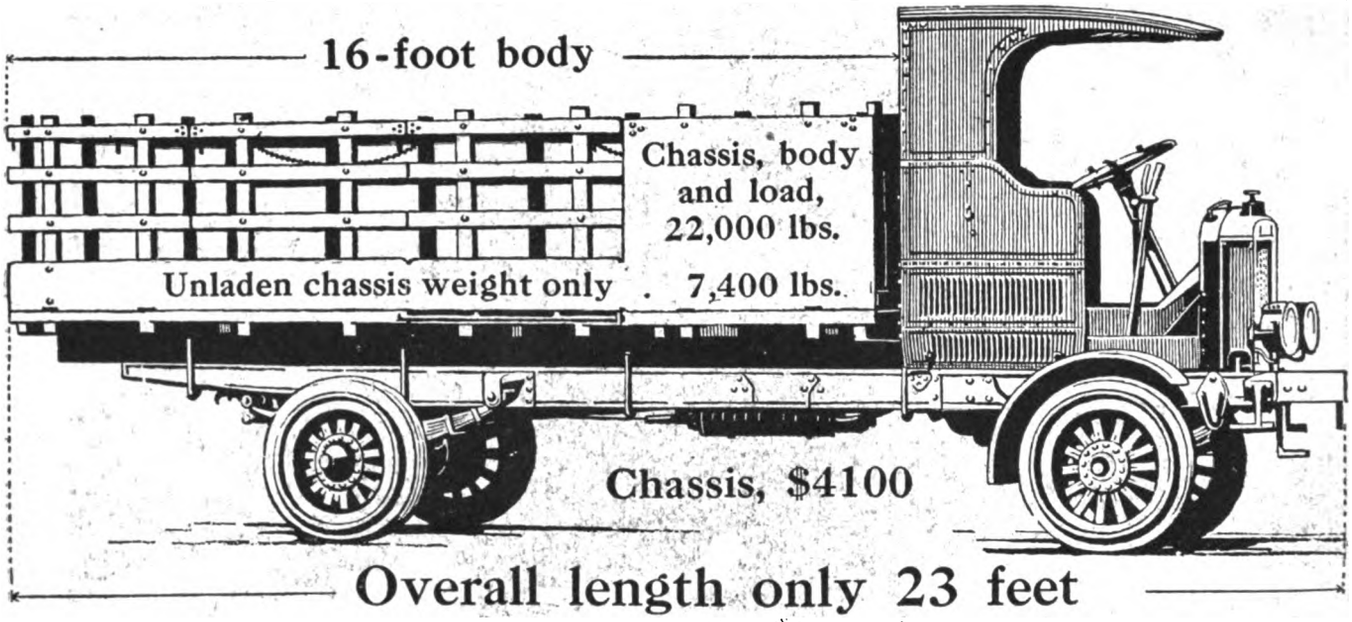
The 4-cylinder 5 ton Heavy Duty Autocar


16-foot body
Chassis, body and load, 22,000 lbs.
Unladen chassis weight only 7,400 lbs.
Chassis, $4100
Overall length only 23 feet

Autocar engine under seat

Saves space everywhere

wharves and terminals
bridge approaches
traffic and narrow streets
garage and warehouse

more trucks to the city block
plenty of room on a 25-foot elevator

THE AUTOCAR COMPANY, Ardmore, Pa., Established 1897

Autocar

Wherever there's a road

We extend a cordial invitation to you to visit the plant of the third largest exclusive motor truck manufacturer, while attending the Ninth National Foreign Trade Convention at Philadelphia, May 10, 11, and 12.

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POWER WAGON

Vol. XXVIII. CHICAGO, APRIL, 1922. No. 209.

Timken Denies Rumors of Unit and Vehicle Combine

RUNNING BUSINESS INDEPENDENTLY

Owing to the prevalence of rumors concerning its activities and its plans growing out of the parts servicing idea, the Timken-Detroit Axle Company has found it necessary to issue a categorical denial of them in order to present the company's sale policies in their true light. The following letter received from A. R. Demory, president of the company, explains the situation as the company wishes it to be understood:

"Ordinarily we prefer to ignore rumors, but there have been so many persistent rumors recently concerning us and our connection with certain companies, which statements have made it appear that we are combining to enter into a warfare with certain companies, that we feel we must make a statement as to our position. We are not in a combination with parts makers, either in the sale of units or servicing, nor are we in any combination with any automobile or truck manufacturer. We are in business to manufacture axles and sell them to anyone who is willing and able to buy and pay for them. It happens that for the purpose of serving the users of our product, we are selling parts to a number of parts stations who sell Continental parts and others, but that is purely an arrangement between us and the parts stations, and not a group arrangement between the unit makers.

"The statement that we have joined with a number of unit makers and the Durant or Gray Motors is untrue. It is a fact that we are now selling axles to the Durant Motors Company for its 6-cylinder car, which is made at Muncie, and we should be very glad to continue this arrangement and increase our connection with the Durant Motors. This is purely a sales arrangement, and has no other object than the selling of our product to a company that is in the automobile business.

"We are not so stupid as to attempt to attack any company in the automobile business nor have we combined with any group in financing or promoting their buiness. We are confining our efforts, as we have in the past, to the manufacture of our own special product and selling it in a very legitimate way. We feel we owe this statement to ourselves, to our customers, and to the trade in general. Briefly, our position is this:—We are axle manufacturers. We own and control our business and consider every automobile and truck manufacturer as a possible customer. Every arrangement we have is a very simple contract for the sale of axles at a definite price, and our interest in the customer we sell is purely one of serving him as his unit maker."

Better Truck Business

Good-sized orders are being booked by the Kelly-Springfield Motor Truck Company. During a recent week it received an order for eight motor trucks from the city of New Orleans, to be delivered within the next two weeks. There are 75 per cent. more men employed in the plant than last October.

While in the city conferring with Superintendent Charles H. Smart, of the Springfield Works of the International Harvester Company, A. A. Jones, assistant to Cyrus McCormick, works manager, with headquarters at Chicago, said that the outlook is brightening considerably. He stated that a shipment of high-speed trucks was made recently to Australia. The foreign demand for trucks is increasing, he said. The Springfield works is turning out 50 trucks daily. These are being shipped about as fast as they are produced.

Marked Improvement, Says Federal

M. L. Pulcher, vice-president and general manager of the Federal Motor Truck Company, Detroit, reports a "marked improvement" in the truck business within the last thirty days and he finds this general tone in evidence with all the men with whom he comes in contact.

Autocar's Business Better

The Autocar Company, Ardmore, Pennsylvania, reports that business so far this year is 25 per cent. better than that of the same period of last year. The factory has increased its weekly working time to 50 hours and the working force now numbers 1,250 men.

February Truck Output Far Ahead of That of January

TRUCKS STAND BETTER THAN CARS

Truck production in February, according to reports made to the government, reached 12,898 as compared with 9,162 in January, an increase of 3,736 or 40.7 per cent. Compared with the December production of 8,305 trucks, the January figures showed an increase of 10.3 per cent. During February production exceeded that of last October and represented the third best month during the last twelve. Since last summer the monthly production of trucks has shown the following figures: July 10,761, August 13,076, September 13,645, October 12,810, November 10,009, December 8,305, January (1922) 9,162, February 12,898.

February production of passenger-cars amounted to 109,005, which was 27,391 or 33.5 per cent. above that of January, 81,614. In December the total output of cars was 70,690, so that the January figures show an increase of 10,924 or 15.4 per cent. over those of December.

It will be observed from the data given below that the truck business has made a much better relative showing than the passenger-car branch of the industry during the last eight months for which detailed monthly production reports are available. During the last seven months the average monthly truck output has been 6 per cent. greater than that for last July, while the average monthly passenger-car output during the same time shows a decrease of 29.7 per cent. compared with that of July. In every month but one—November—truck production made a relatively better showing than car output, disclosing uniformly a higher percentage of increase and a lower percentage of decrease than passenger-car production, and in one month—September—showing a gain while car output fell off 13.7 per cent. The figures for the period follow:

Month.	Trucks		Cars	
	Production.	Percentage, Change.	Production.	Percentage, Change.
July, 1921	10,761	.....	165,575	.....
August	13,076	21.5% inc.	167,705	2.2% inc.
September	13,645	4.3% inc.	144,699	13.7% dec.
October	12,810	6.1% dec.	134,734	6.8% dec.
November	10,009	21.9% dec.	106,042	21.2% dec.
December	8,305	17.0% dec.	70,690	33.3% dec.
January, 1922	9,162	10.3% inc.	81,614	15.4% inc.
February	12,898	40.7% inc.	109,005	33.5% inc.
Monthly average from August to February	11,415	.....	116,355	.....
Relation of average to July, 1921	.....	6.0% inc.	.....	29.7% dec.

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Republic's Reorganization Plan Completely Fulfilled

FIFTEEN BRANCHES TO BE ESTABLISHED

At a directors' meeting of the Republic Motor Truck Company, held in New York City on February 24, the resignation of all officers and directors of the company was tendered for acceptance at the pleasure of the board. This action followed the passing of control of the company from eastern interests, headed by Mr. Willys, to western interests centered in Michigan and Illinois.

The resignations of Mr. Willys, as president and director of the company, of Walter P. Chrysler, as a director and member of the executive committee, and of James E. Kepperley, as a director, were accepted, and Colonel Frank E. Smith was elected president, succeeding Mr. Willys, O. W. Hayes, H. D. Minich, and Charles G. Rhodes, were elected as directors in the places made vacant by the resignations of Messrs. Willys, Chrysler and Kepperley. Both O. W. Hayes and H. D. Minich were made vice-presidents and Charles G. Rhodes was elected secretary. The resignation of H. I. Shepherd, as treasurer of the company, was accepted, but he will continue as a director, as will also W. J. Baxter, until their successors can be determined upon, at which time their resignations will be accepted by the board.

These changes bring back to the West the control, which was transferred to New York at the time Mr. Willys and his associates purchased the stock of the company from Messrs. Burt, Rhodes, Moore, King and their associates in Michigan.

During the past eighteen months, like many truck manufacturers, or, for that matter, all industry, Republic has gone through the throes of deflation, and is now emerging, with its "decks cleared for action."

Colonel Smith, who came to Republic as vice-president and general manager in November, 1920, brought to the company a knowledge of automotive business, accumulated in an experience extending back almost to the inception of the automotive industry. Under his management, and with the realization by him that the future of transportation by motor truck is wholly contingent upon the kind of continuous and dependable service rendered, a complete reorganization and change in policy of Republic service business has been brought about.

In the furtherance of the Service problem, and the working out of a comprehensive sales plan Republic has either established or is in process of establishing branch houses for distributing trucks and parts, at Detroit, Buffalo, Albany, Boston, New York, Newark, Philadelphia, Baltimore, Atlanta, Charlotte, Pittsburgh, Kansas City, St. Louis, Chicago, and San Francisco, and expects to establish additional branches at other points during the next few months.

The working organization of the business will consist of:

Colonel Frank E. Smith, president; O. W. Hayes, vice-president in charge of engineering, purchasing and production; H. D. Minich, vice-president in charge of finance and accounting; Charles G. Rhodes, secretary; Glenn S. Crisp, assistant treasurer; David Thomas, chairman of the sales board of control; F. H. Akers, sales manager; E. E. Sieg, assistant sales manager; S. R. Swiss, advertising manager; Chas. Gould, in charge establishment of branches; R. M. Sparks, manager public utilities division; H. H. Swiss, assistant export sales manager; H. L. Dewey, manager special equipment department; Gordon Cameron, service manager; A. E. Davies, factory manager; B. F. Wright, chief engineer; J. C. Haggart, assistant chief engineer.

Assets.

	1921.	1920.
Plant equipment, etc.	$2,148,585	$2,309,636
Good will	4,805,936	4,805,936
Investments, etc.	1,252,476	2,004,245
Inventories	3,842,995	6,612,392
Notes and accounts receivable	519,909	773,878
Cash res. red. fd.	.....	112,500
United States securities.	11,375	8,714
Cash	260,186	493,281
Deferred charges	139,274	190,606
Total	$12,980,736	$16,311,188

Liabilities.

Preferred stock	$ 826,200	$ 836,200
*Common stock	7,233,894	8,418,450
Mortgage payable	91,162	91,162
First mortgage gold notes	2,500,000	2,500,000
Notes payable	1,562,149	2,029,873
Accounts payable, etc.	486,779	571,697
Deal depos.	75,552	.....
Reserves	205,000	355,000
Surplus	.....	1,508,806
Total	$12,980,736	$16,311,188

*100,000 shares of no par value.

Mack Sees Good Business

Officials of the International Motor Company look forward to sales of more than $25,000,000 this year. The company is well intrenched with cash and liquid assets, and no change is looked for in the preferred dividends. Although $300,000 has been appropriated for a further shrinkage in inventory values, officials believe there will be no necessity for inventory adjustment this year. The cost of operation is low and it is expected that net earnings will be in excess of preferred dividends. Thus far in 1922 business has shown a healthy improvement. March sales were greatly in excess of February and January, and officials look forward to satisfactory operations throughout the year.

New Truck Prices

The following changes in the retail chassis prices of various trucks have been announced since the last issue of POWER WAGON went to press:

Truck.	Old Price.	New Price.	Reduction.
Acason, 1½-ton	$2,485	$1,950	$535
Acason, 2½-ton	3,295	2,750	545
Acason, 3½-ton	4,295	3,450	845
Acason, 5-ton	5,250	4,350	900
Duplex, 3½-ton	4,250	3,500	750
Kearns-Dughie, 1-ton.	1,600	1,150	450
Kearns-Dughie, 2-ton.	2,200	1,650	550
Stoughton, 1-ton	1,995	1,790	225
Stoughton, 1½-ton	2,350	2,150	200
Stoughton, 2-ton	2,800	2,490	310
Stoughton, 3-ton	3,600	3,150	450
Wichita, 1-ton	2,300	1,875	425
Wichita, 2-ton	2,800	2,400	400
Wichita, 3-ton	3,600	3,200	400
Wichita, 4-ton	4,000	3,500	500

Motor Vehicle Shipments Indicate Improved Trade

MAKERS ENTER 1922 IN BETTER SHAPE

In addition to numerous reports of increased activity on the part of motor truck manufacturers, concrete evidence of improving motor business is seen in the larger shipments of vehicles being handled by the railroads. Shipping records of the New York Central, which serves practically all the large producing centers of the eastern section of the United States, show a continuous upward trend in motor shipping since the beginning of the year.

February was a banner month, eclipsing the high record of last year. During the third week of that month, cars loaded with motor vehicles averaged 475 a day, compared with an average of 364 carloads daily in June, the best month in 1921. In the first week of February, motor vehicles car loadings averaged 357 a day, and the second week 360 a day. For January the average was 305 carloads daily.

Sales improvement in all parts of the country was reported at a recent meeting of the National Automobile Chamber of Commerce, and Roy D. Chapin, vice-president of the chamber and president of Hudson Motor Car Company, stated that he believed the automotive industry was looking forward to the best spring in two years.

Business is better from every angle, the chamber states. Employment in Detroit is 132 per cent. improved over the latter part of 1921. Comparison of carload shipments from identical factories in January, 1922 and 1921, shows a gain of 150 per cent. Truck output in January gained 38 per cent. over December, while passenger-car production gained 40 per cent.

Few authorities expect this year's production to equal the 1921 aggregate of 150,000 trucks and 1,457,000 passenger-cars, but better earnings are anticipated, despite smaller volume. This is attributable to the drastic liquidation and depreciation of inventories which was effected last year, coupled with substantial reductions in overhead and expenses.

General Motors and Pierce-Arrow, two of the principal motor companies which have issued reports for 1921, apparently decided to take full cognizance of last year's losses on both raw and finished material as a result of lower prices, for both companies wrote down their inventories drastically. Action of these two is typical of what was done in the motor industry as a whole last year, so that it is a safe assumption that most manufacturers entered 1922 in better physical condition than for some years past.

Massachusetts to Inspect Trucks

Inspectors of the Massachusetts state highway department will be stationed on principal thoroughfares throughout the state to inspect heavy motor trucks and see that they are not overloaded. This program will be carried out to prevent tearing up the highways of the state.

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January Exports Decline in Number and in Value

TRUCK UNIT VALUE SHOWS INCREASE

Exports of automotive products from the United States during January, 1922, were subject to a reaction, their total value being nearly one-sixth smaller than during December, 1921. Shipments of cars decreased somewhat more than one-tenth, those of motor trucks somewhat less; exports of motorcycles showed a substantial increase over the preceding month. Shipments of all other automotive products, especially of motor boats, declined heavily. The unit value of cars exported decreased $48, while the unit value of trucks increased $24.

Automotive exports during January, 1922, as compared with those of January, 1921, show an all-around decrease of approximately 75 per cent. The unit values of cars and trucks exported are also considerably lower.

Our leading markets for motor trucks gave proof of basic strength, their relative position remaining practically the same; and all of them, with the exception of Australia, showed improvement. The accompanying tables show the detailed figures.

Pennsylvania R. R. May Try Trucks

The Merchants' & Manufacturers' Association of Baltimore has been informed by the Pennsylvania Railroad Company that a plan for motor truck distribution of freight is under consideration for that city. It is the belief of Robert C. Wright, general traffic manager of the Pennsylvania, that the vast volume of less-than-carload traffic congests the rails of the terminals and interferes with the proper handling of car-load traffic. For that reason he believes it should be eliminated entirely from important stations and provided for by the construction of a large warehouse on the outskirts of the city from which store-door deliveries would be made by motor truck at the expense of the railroad.

Milwaukee "Trackless Trolleys"

As the result of the success experienced by the Milwaukee Electric Railway & Light Company in the operation of a number of motor 'buses as connecting lines to regular street-car traffic arteries and similar uses, the utility has now applied to the Milwaukee common council for permission by ordinance to place in operation a "trackless trolley" on Lincoln Avenue, which would be the first motor 'bus line using overhead trolleys for power in operation in Milwaukee.

AUTOMOTIVE EXPORTS, DECEMBER, 1921, AND JANUARY, 1922.

Classification.	December, 1921 Number.	December, 1921 Value.	December, 1921 Unit Value.	January, 1922 Number.	January, 1922 Value.	January, 1922 Unit Value.	Per Cent of Increase (+) or Decrease (—). Number.	Per Cent of Increase (+) or Decrease (—). Value.
Motor trucks and 'buses, except electric:								
Up to 1 ton	*	*	*	222	$114,067	$514	....	....
Over 1 to 2½ tons	*	*	*	220	287,531	1,307	....	....
Over 2½ tons	*	*	*	22	59,595	2,709	....	....
Total†	511	$ 495,790	$ 970	464	$ 461,193	$994	— 9	— 7
Parts of cars and trucks	.....	2,683,850	.....	.....	2,060,619	.....	....	—23
Electric cars and trucks	*	*	*	26	41,125	1,582	....	....
Station and warehouse motor trucks	19	19,494	1,026	6	7,590	1,265	—68	—61
Trailers	*	*	*	33	21,003	636	....	....

*Not separately stated prior to Jan. 1, 1922. †Includes "electric" prior to Jan. 1, 1922.

AUTOMOTIVE EXPORTS, JANUARY, 1921, AND JANUARY, 1922.

Classification.	January, 1921 Number.	January, 1921 Value.	January, 1921 Unit Value.	January, 1922 Number.	January, 1922 Value.	January, 1922 Unit Value.	Per Cent of Increase (+) or Decrease (—). Number.	Per Cent of Increase (+) or Decrease (—). Value.
Motor trucks and 'buses, except electric:								
Up to 1 ton	*	*	*	222	$114,067	514	....	....
Over 1 ton to 2½ tons	*	*	*	220	287,531	1,307	....	....
Over 2½ tons	*	*	*	22	59,595	2,709	....	....
Total†	1,559	$2,516,379	$1,614	464	$ 461,193	$ 994	—70	—82
Parts of cars and trucks	.....	9,679,181	.....	.....	2,060,619	.....	...	—79
Electric cars and trucks	*	*	*	26	41,125	1,582	....	....
Station and warehouse motor trucks	98	81,699	834	6	7,590	1,265	—94	—91
Trailers	*	*	*	33	21,003	636	....	....

*Note separately stated prior to Jan. 1, 1922. †Includes "electric" prior to Jan. 1, 1922.

CHIEF MARKETS FOR MOTOR TRUCKS AND 'BUSES.

Country of destination.	January, 1921. Number.	January, 1921. Value.	December, 1921. Number.	December, 1921. Value.	January, 1922 Number.	January, 1922 Value.	January, 1922 Unit Value.
Motor trucks and 'buses, except electric:*							
Australia	199	$303,369	†111	†$149,939	109	$144,300	$1,324
Mexico	133	270,702	65	40,696	75	58,342	778
Japan	100	123,051	64	46,790	62	57,675	930
Canada	78	142,217	34	43,878	42	54,357	1,294
Netherlands	42	29,298	34	14,860	42	21,607	515
British East Indies	87	176,832	18	20,263	27	30,745	1,139

*Includes "electric" prior to Jan. 1, 1922. †Figures for "British Oceania."

Industry's Size Estimated by Manager of N. A. C. C.

1921 PRODUCT WORTH $1,222,350,000.00

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, gives the following figures on the automotive industry in 1921:

Motor vehicles registered in U. S. (approximately)	10,000,000
Motor trucks	1,000,000
Motor cars	9,000,000
Motor vehicles owned by farmers	3,000,000
Motor trucks	150,000
Motor cars	2,850,000
Farm produce hauled by motor transports (tons)	134,400,000
Motor buses in operation	20,000
Passengers carried annually by motor car	6,000,000,000
Freight handled annually by motor truck (tons)	1,200,000,000
Motor vehicles produced	1,680,000
Decrease from 1920 production	24%
Trucks	145,000
Cars	1,535,000
Wholesale value of vehicles produced	$1,222,350,000
Decrease from 1920 wholesale value	45%
Wholesale value of motor trucks produced	$ 134,250,000
Wholesale value of motor cars produced	1,088,100,000
Average wholesale price motor truck, 1920	1,273
Average wholesale price motor truck, 1921	968
Average wholesale price motor car, 1921	702
Average wholesale price motor car, 1920	897
Motor truck factories in United States	140
Motor car factories in United States	105
States in which factories are located	32
Employes engaged in truck and car manufacture	256,000
Gasolene production (U. S.) 1921 (gallons)	5,360,014,000
Gasolene consumption (U. S.), 1921 (gallons)	4,506,706,900
Increase in production over 1920	9.8%
Increase in consumption over 1920	5.9%
Solid tires produced	377,000
Tire casings produced	19,379,000
Tire tubes produced	24,157,000
Value of motor vehicles and parts exported, including engines and tires	$ 102,945,610
Number of motor trucks exported	7,748
Value of motor trucks exported	$ 11,457,616
Number of motor cars exported	30,639
Value of motor cars exported	$ 33,712,208
Number of countries to which vehicles were exported during year	114
Motor truck dealers	24,488
Passenger car dealers	38,216
Garages	59,093
Repair shops	55,521

Good Export Trade

"The rise in sterling has created the one bright spot in the truck business," says M. L. Pulcher, vice-president and general manager Federal Motor Truck Company. "Our foreign business has been coming back rapidly. In the first two months of this year we have shipped more trucks for export than during all last year. Typical of how foreign orders are coming in is one from India for 30."

Domestic business is not good, Mr. Pulcher says, but adds that there is a mild degree of activity in the area north of the Ohio and east of the Mississippi which shows evidence of a wave traveling southward. The advance of the movement is just now in the Carolinas from which new business has sprung up within the last few weeks.

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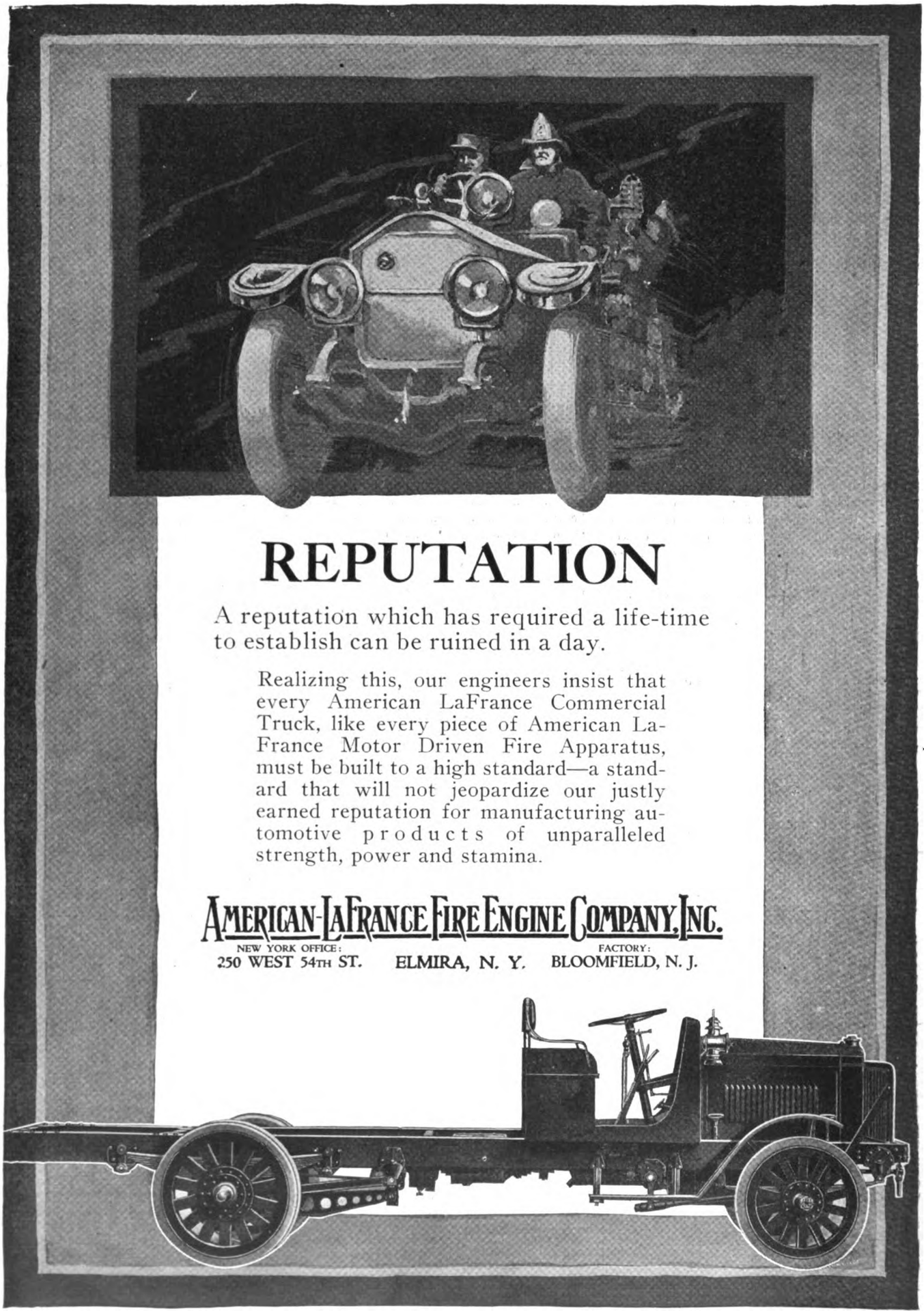

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

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The Parts Making Business

"OF MAKING many parts there is no end," a modern Koheleth might truthfully say, "and many supernumeraries are a weariness of the trade." No credit would be due him for observing what everyone with half an eye can see for himself, but he might very properly be applauded for deploring the pitiable state of affairs that exists among the unit manufacturers and for exhorting them to stern and critical self-examination. For it is the undeniable fact, distasteful as an admission of it may be, that there are altogether too many people making parts for trucks, and that they can not all possibly survive the trials of the business. Only in the field of truck making can a parallel situation be found; only there can one descry the same multiplicity of producers, the same duplication of effort, the same degree of wasteful and needless competition.

Consider for one moment, please, the parts making branch of the truck industry and take stock of its numerous components. What do you find? Thirty makers of axles, twenty makers of engines, fourteen makers of metal wheels and a like number making wood wheels, thirteen makers of clutches and transmissions, thirteen makers of universal joints—to mention but a few of the most important units that enter into truck construction—all contending vigorously for a share of the business of nearly three hundred truck makers, the great majority of whom produce annually less than one hundred trucks each and have distributing systems of from two to four members.

Is it possible for all these wildly hopeful and as yet undaunted parts makers to continue in a business that has quite definite and easily ascertainable dimensions? Will anyone with an eye single to the welfare of the parts making business argue for their retention in an industry that is crowded to the point of suffocation, wherein the bulk of the production is in the hands of a very few, while the majority of the makers struggle for the minority trade that remains? Who will say that the parts making business is not overexpanded, when there are from three to five times as many producers as are needed to meet the requirements of the truck assembling trade even in the latter's unwarrantably inflated condition of to-day?

Can anyone excuse the existence of the great bulk of parts producers on the ground that they have contributed anything useful to the industry? Have they offered a superior product or a less expensive one of equal worth? Have they introduced anything to advance the art of making, selling or applying motor trucks? Have they not, in fact, merely added to the confusion by multiplying the number of factors; have they not befuddled truck maker and truck buyer; have they not made business more difficult and problematical for those who have developed it and are striving to maintain it? Have they done anything but weaken the industry, while seeming to give it the color of health?

These surplus producers are as much to be pitied as the industry off which they seek to live, since they are the victims of delusion through being one degree removed from the field of first-hand knowledge and, therefore, dependent on others for their guidance. Every year the industry to which they have been attracted has been painted in hues brighter than the year before; the "quack" promoter, the "boom" salesman, the "booster" journalist, the uninformed and for that reason over-enthusiastic truck maker (himself a victim, though of another brand)—all have combined, sometimes unconsciously, sometimes intentionally, to mislead the trade as to what its true dimensions were, what its output should be, and what its market could absorb. Does anyone believe that the inflation visible everywhere about us would have come had the picture been accurately drawn? Could the malicious opportunist have been enticed into this industry if its difficulties, its dangers and its limitations had been correctly portrayed? Could the careful buyer have been induced to invest in the product of unstable producers if the tenuous nature of their chances of permanence had been veraciously described? Could the semblance of responsibility have been lent to the host of irresponsible truck makers without the dazzlingly brilliant background furnished by a multitude of apparently responsible parts makers?

The industry must realize that the menace presented by these parts making supernumeraries is a real one and a great one, not one born of the war and destined to disappear with the passing of post-war reactions. Their capacity for mischief is in inverse ratio to their ability to achieve success, for, contrary to what we have been taught, nothing succeeds like failure and adversity promotes invention. Men who get nothing but the leavings from the industrial table lead an uncertain existence; with their growing hunger comes increasing desperation. And just there lies the source of the reprehensible practices, the destructive methods, that have made the business even more difficult than any had supposed it could be and of which every well-established parts maker rightly complains. They are the cancer that gnaws at the vitals of industry, and the diagnostician may suggest either of two remedies, both of remarkable efficacy. Its force may be dissipated through the X-rays of publicity, or its rambling tentacles may be removed by timely operation. A combination of the two methods, it would seem, holds much promise for the recovery of the parts making business.

Survival of the Fittest

IT SHOULD not be necessary in this age of enlightenment to caution men against the danger of attempting to apply in a superficial manner the laws of biology to the problems of business. It should not be necessary to warn them against the ingenuousness of hoping that time, and time alone, will remedy the ills that beset it. Yet this tendency is characteristic of the conservative, who will tell you that (in some mysterious way quite as wonderful as the workings of Nature herself) the wrinkles of to-day will be ironed out to-morrow, or next day, or sometime, and that it is really not worth while to try to shape, alter or hasten the processes of destiny. This passes in some quarters for optimism; it is really nothing but naïveté.

While this industry is groaning and writhing under the

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attacks of parasites that share its meager nourishment and embitter its spirit, men are found who are content to leave the remedy to time, in the belief that in due course we shall see the survival of the fittest. Can anyone seriously contend for such a point of view? Does anyone expect to live long enough to observe the great changes effected by time, by the selective and eliminative methods of evolution that has taken a million years to make a man of a dumb brute? Are the moving spirits of this trade building a structure for the *n*th generation to come, or do they aim at the extraction of the maximum profits for the living?

These questions are not idly put. The menace of such a *laissez faire* attitude can not be exaggerated. Nothing could be more unsophisticated than the expectation that these pinching times are going to accomplish the shrinkage and elimination of undesirable factors that the industry so badly needs. The birth-rate among makers and dealers still exceeds the death-rate, and this unfavorable balance will persist as long as the will to exist remains instinctive in business as in life, and as long as no one can be found to embrace a policy of birth-control through local sterilzation. Commercial enterprises do not wither and die because their end is predicted and confidently expected; they have a most remarkable vitality and power to survive under the harassing difficulties of times such as these; there are always some who have the desire and the means for resuscitating these apparently lifeless forms that contribute so little and consume so much.

Let those who have abiding faith in the omnipotence of time as a panacea nurse their fallacies; they will not live long enough to learn the futility of complacency. This industry has been made by men of vision, of courage, of action; surely they will not let it be unmade by those of blindness, of procrastination, of indifference. The fountain-heads of this industry's evils must be dried up artificially; no hurricane of adversity can dissipate them now, and the sunshine of prosperity will serve but to promote their further growth.

Truck Production Rising

Reports made to the Bureau of the Census show that motor truck production increased 11 per cent. in January as compared with December of last year. Purchases of parts and accessories were over twice as large as a year ago, while accounts past due were half as great and notes outstanding decreased 22 per cent.

The production of trucks during January totalled 9,182 as compared with 8,305 in December, while that of cars reached 81,590 as contrasted with 70,690 in December. Shipments of motor vehicles by railroad were 19,600 car-loads against 15,241 for December, machines driven away numbered 9,950 against 7,397 in December, and the number delivered by boat was 169 as compared with 154 for December.

Taking 1913 average monthly production as a base at 100, that of 1920 was 1,371 and that of 1921 was 617. The poorest month of last year was 51, December, 1921, stood at 424 and January, 1922, at 469.

Taking 1919 average monthly production as a base at 100, that of 1920 was 67 and that of 1921 30. The poorest month since July 1, 1921, was 32 and the best month 52. January, 1922, shows 35 and December of last year 32.

Tire production in January shows a slight increase over December, 1921, the figures being, respectively; 2,055,000 and 1,840,000 for pneumatics, 2,343,000 and 2,070,000 for tubes, and 40,000 and 40,000 for solid tires. Shipments declined during January and stocks were correspondingly increased. Comparison with corresponding months of 1920 or 1921 shows that the production of solid tires increased nearly 100 per cent. and that of pneumatics nearly 200 per cent. Stocks are still below those of the earlier months.

Tire Prices May Rise

An advance in tire prices appears certain before summer. Although some companies may take action sooner, the consensus in the trade is that new schedules will go into effect about May 1. Most rubber companies sell tires to dealers on what is termed a "dating" basis. Payment for tires purchased in the current quarter, for example, is due in May. The fact that the current dating period expires in May accounts for the belief that no price change is likely before that time.

Higher tire prices can not be attributed to increased labor or raw material costs. Crude rubber, which was selling around 20 cents a pound two months ago, is now quoted at 16 cents. Good grades of combed Egyptian tire fabric are obtainable at 75 cents a pound, a price which has prevailed since the latter part of 1921. Labor costs probably are below pre-war levels.

Although costs have not increased recently, some rubber companies are beginning to realize that their margin of profit on current schedules is not sufficient. In May, 1921, when Goodrich unexpectedly announced a 20 per cent. reduction in tire prices, all other rubber companies followed suit. The following November, after Goodyear had made a definite announcement that tire prices would not be reduced, a sentiment informally echoed by other companies, Firestone suddenly reduced 20 per cent. and again the trade was forced to fall into line.

This unusually keen competition among the rubber companies was due, principally, to their efforts to stimulate business and liquidate inventories. Since most companies have substantially liquidated and fully written down their stocks of both raw and finished materials last year's price reductions have served their purpose. An advance of 10 per cent. in tire prices would give most of them a margin of profit on which satisfactory showings are possible.

Winther Reorganization

Winther Motors, Inc., wishes to have it known that recent announcements concerning the consolidation of the Winther Motor Truck Company, the Kenosha Wheel & Axle Company and the Marwin Truck Corporation which reported a huge increase in capitalization were incorrect. The consolidation was effected purely for reasons of convenience and economy in operation. The new concern is capitalized at $1,000,000 preferred stock and 600,000 shares of common of no par value, about half of which has been issued and is outstanding.

The consolidated balance sheet of the Republic Motor Truck Company, as of December 31, 1921, compares as follows:

Only $50,000,000 for Federal Aid

The Senate Committee on Post-Offices and Post Roads, of which Senator Charles E. Townsend of Michigan is chairman, has reported out the Post-Office appropriation bill with a rider providing for an appropriation of $50,000,000 for federal aid for highway construction in the fiscal year of 1923; $65,000,000 for 1924; and $75,000,000 for 1925. The first amount becomes available July 1 of the present year and is essential to the continuation without interruption of the highway building program. The measure also contains appropriations for forest roads of $7,500,000 for each of the fiscal years of 1924 and 1925. The bill passed the House without a rider and accordingly, if accepted by the Senate, must be referred back to the House for approval.

The sums mentioned represent the absolute minimum requirements for the highway program. To lower them would be to decrease efficiency and to lower the standards of road construction in the United States. Speaking without prejudice, Thomas H. MacDonald, chief of the Bureau of Public Roads, recently stated that if the people of the United States desire to see a completed system of 7 per cent. of the highways of the country within the next decade, in his judgment federal aid appropriations would have to be continued at the rate of $100,000,000 a year. The program will take fifteen years at the rate of $75,000,000 a year, plus state and country contributions and twenty years at the rate of $50,000,000 annually. It is evident that losses in transportation costs due to poor highways would far exceed the cost of construction, if the longer program is adopted.

The Federal Motor Truck Company announces the establishment of a factory branch at San Francisco, with a completely equipped sales and service plant at 1123 Post street. J. H. Hartzell is vice-president of the local operating company. E. S. Jones has been made manager and G. F. Currie of Detroit, secretary and treasurer. Many truck sales have been made and numerous dealers appointed by this company during the past thirty days.

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General Motors Fits Terms to Farmer-Buyer's Incomes

AFFECTS TRUCK AND TRACTOR SALES

The General Motors Acceptance Corporation has evolved a series of plans for financing the sales of Samson trucks and tractors to farmers, the payments being arranged to suit the income periods of the buyers.

Plan No. 1 is recommended for sales to dairy farmers or those having a regular monthly income. This provides for a down payment of 30 per cent. in cash and equal monthly payments over a period of 12 months or less, according to the ability to pay.

Plan No. 2 is recommended for sales to farmers raising cotton or other yearly crops. This provides a down payment of 40 per cent. in cash and the balance in one payment in 12 months or less.

Plan No. 3 is recommended for sales to farmers raising an annual crop and livestock. This provides for two payments, the first in six months or less, the second in 12 months or less, with a one-third cash-down payment.

Plan No. 4 provides for two deferred payments of 8 and 18 months with a down payment of 40 per cent. This permits the final payment to be spread over two crops and allows the use of the machines in preparing the soil for each crop.

Plans also have been worked out for the disposal of used trucks taken in by dealers in the rural districts in part payment for tractors and implements. One of these provides for a 40 per cent. down payment with equal monthly payments for 12 months or less. The other is for 50 per cent. down with one deferred payment in 7 months or less.

On the monthly payment plan a rebate of one-half of 1 per cent. a month will be made where the entire indebtedness is met before due. A rebate of 1 per cent. a month is allowed for each month of anticipation under plan No. 2. Under plans No. 3 and No. 4 the rebate is 1 per cent. a month on each payment prepaid for each full month of anticipation.

The wholesale plan is a method of financing factory shipments of Samson trucks, tractors and power implements to be stored either in a warehouse or on the dealer's showroom floor. Under this plan Samson products may be shipped by freight direct to the dealer or by the manufacturer to a subdealer for the account of the direct dealer.

Only enough products are financed to enable the dealer to have a representative stock and to enable prompt delivery to customers. No stock will be financed which the dealer can not sell at retail before the maturity of the note. All papers in connection with the transaction are handled through the local bank of the dealer. The dealer must pay 15 per cent. of the invoice price of the products. The differential charged by the company is three-quarters of 1 per cent. on the 85 per cent. financed. Products remain the property of the finance corporation until fully paid for. If paid before maturity of the note, refunds of one-fortieth of 1 per cent. are provided for each day the money is not used after the first month.

No notes covering invoices will be drawn for more than 6 months, because no more should be bought than can be sold in 6 months. Wholesale indebtedness should be cleaned up at least once a year, the company holds, at a time when collections are best in the territory. This clean-up date will be determined by the acceptance branch under which the dealer is operating and which will notify him.

Under the wholesale finance plan all products will be financed. Under the retail plan, Samson implements will not be financed except when sold in conjunction with a tractor. Bank fees are paid by the corporation for handling the wholesale transactions. Insurance on products up to the time the dealer note is paid is covered by the differential rate.

Investigating Trackless Transport

On February 1 the Trackless Transportation Committee of the Engineering Association held a meeting at association headquarters at which were present Martin Schreiber (chairman), J. M. Bosenbury, H. A. Clark, A. T. Clark, C. G. Keen and J. W. Welsh (secretary). Work was assigned to the different members as follows:

1. The "Trackless Trolley"—Messrs. J. M. Bosenbury and H. A. Clark.

2. Chassis—Messrs. A. T. Clark and F. R. Phillips.

3. Body—Messrs. Martin Schreiber and C. G. Keen.

H. A. Clark will also try to secure information on double-deck bodies and Mr. Bosenbury will prepare an explanation of the outstanding features in connection with the poppet-valve versus the sleeve-valve type of engine.

In considering the above subdivisions the committee will make recommendations on general dimensions such as wheel-base, etc., in accordance with instructions of the American Electric Railway Association's committee. In connection with the "trackless trolley" the committee will make recommendations with respect to lowering the center of gravity and the use of two motors instead of one and suitable driving mechanisms.

It is expected that preliminary reports will be ready to be presented at the next meeting of the committee, which will probably be sometime before the mid-year meeting.

New Transport Officers

The Transport Truck Company of Mount Pleasant, Michigan, held its annual meeting on February 22. All officers were reëlected: President and general manager, M. A. Holmes; vice-president and assistant general manager, H. E. Chatterton; secretary-treasurer, A. E. Gorham; directors: The officers and C. E. Hagan, E. J. McCall, D. A. Warner, and F. W. Gargett.

Wholesale Gasolene Prices Disclose Tendency to Rise

ARE NOW ABOUT DOUBLE THOSE OF 1915

Changes in the wholesale price of gasolene since the beginning of March have caused only a slight advance in average price in thirty principal cities. The average quotation is now 21.3 cents a gallon compared with 21.2 cents at the end of February. This is an advance of 1.1 cents a gallon above the low of 20.2 cents in 1921, but is still 7.7 cents below the average at the beginning of that year. Recent changes have all been upward.

The increases occurred in four cities on the list. The tank-wagon price was raised 2 cents in Dallas, 1.2 cents in Kansas City, 1 cent in St. Paul and .9 cent in Milwaukee, to 20, 20.2, 22.2 and 20.9 cents a gallon, respectively. A 1-cent increase in St. Paul was the response of independent marketers to a like advance of the retail price by the Standard Oil Company of Indiana. The Kansas City increase also followed the latter announcement.

The present wholesale gasolene prices in thirty cities, low for 1921 and prices on January 1, 1921, 1920 and 1915 follow (in cents a gallon):

	1921.		Jan. 1		
	Present.	Low.	1921.	1920.	1915.
Atlanta, Ga.....	23.0	20.0	31.0	26.0	10.5
Baltimore, Md....	23.0	21.0	29.5	28.5	9.0
Birmingham, Ala..	22.0	20.0	31.0	27.5	10.5
Boston, Mass.....	24.0	25.5	32.0	25.5	14.0
Butte, Mont.....	24.5	23.5	33.5	25.5	13.5
Chicago, Ill.....	19.5	18.0	27.0	24.0	11.0
Cincinnati, O.....	22.0	20.0	30.0	25.0	12.0
Cleveland, O.....	22.0	20.0	30.0	25.0	12.0
Dallas, Tex.....	20.0	18.0	31.0	26.0	11.0
Denver, Colo.....	21.0	22.0	32.0	25.0	13.0
Des Moines, Ia....	21.1	19.5	28.5	24.0	9.5
Detroit, Mich.....	21.2	19.9	28.8	24.5	10.5
Houston, Tex.....	18.0	18.0	29.0	26.0	11.0
Indianapolis, Ind..	20.8	18.6	28.3	25.5	11.0
Kansas City, Mo..	20.2	15.0	26.5	23.4	10.3
Louisville, Ky.....	21.0	23.0	28.5	26.5	11.5
Memphis, Tenn...	19.5	22.0	30.0	25.0	12.5
Milwaukee, Wis...	20.9	19.3	27.9	24.1	11.0
Minneapolis, Minn.	21.7	19.2	28.2	25.0	11.0
New Orleans, La..	19.5	19.5	28.5	22.5	10.5
New York, N. Y..	24.0	24.0	31.0	24.5	12.0
Omaha, Neb.....	22.0	18.5	29.5	24.0	11.5
Philadelphia, Pa...	23.0	21.0	31.0	25.2	10.0
St. Louis, Mo.....	19.0	16.2	26.2	23.5	10.1
St. Paul, Minn....	22.2	21.2	28.2	25.0	11.0
San Francisco,Cal.	21.0	21.0	27.0	21.5	10.5
Seattle, Wash.....	23.0	23.0	28.0	22.5	11.5
Tulsa, Okla.....	18.0	17.0	28.0	23.0	9.5
Vicksburg, Miss...	20.0	21.0	28.0	25.0	11.0
Wilmington, Del..	23.0	21.0	31.0	25.3	12.0

Will Make Taxicabs

A company capitalized at $10,000,000 soon will be incorporated in New York State to manufacture a standard taxicab, which will sell for approximately $1,200. Identified with the new enterprise will be Frank L. Klingensmith, president of the Gray Motor Corporation, and Frank F. Beall, his associate in that company; H. T. Hanover, president of the Apex Motor Corporation, and Nat Jacoby, who is now at the head of the Black & White Cab Company of New York. The new corporation will be entirely separate from Gray Motors.

The plans call for a vehicle from which will be eliminated all unnecessary equipment and attachments and will be manufactured and operated by the company. A plant already has been located. The operating end of the business will be under the direction of Mr. Jacoby.

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"Time to Clean House"

The following paragraphs contain extracts from a number of letters addressed to the editor concerning the editorial "Time to Clean House" which appeared in the March issue.

"We certainly congratulate you on your editorial 'Time to Clean House.' It is both appropriate and timely and, if you have some reprints available, we would like to have a dozen copies for distribution. Unfortunately the 'boom' times in 1919 and the first half of 1920 resulted in a lot of 'shoe-string' manufacturers starting to build motor trucks, and anybody who saw a chance to sell a truck at retail felt justified in writing in for a truck agency. We are now experiencing the aftermath of this unhealthy inflation of the motor truck industry, and it looks now as if it is going to be a case of the survival of the fittest." —M. A. S., Detroit.

"I thank you for your leading editorial in the March issue. You certainly have hit the nail on the head."—S. L: D., Ardmore, Pa.

"I am quite in sympathy with the text of your plea and am willing to do anything and everything I can to put this industry on a more stable basis. To those who may doubt the seriousness of this situation the figures are available to prove the facts. Unfortunately we find a lackadaisical attitude on the part of the big, responsible makers, who seem to think that nature will take its course and these irresponsibles be eliminated in the natural order of things. But when one elimination takes place, instantly several other concerns jump into the limelight to gather all the profits possible in the truck business. I shall be very happy to do anything I can in this cause, and you have only to tell me in what direction I can help and you will find me ready."—O. P. R., Buffalo, N. Y.

"I think this editorial, together with others which you have already run, contains a lot of good thoughts and ought to result in a great deal of benefit."—J. K. McK., Kenosha, Wis.

"I have read with a great deal of interest your editorial entitled 'Time to Clean House.' I just want to send you a line to let you know how I appreciate the clear-headed and courageous manner in which you have stated the conditions in that editorial."—P. H. F., Springfield, O.

"Your editorial, 'Time to Clean House, in the current issue of POWER WAGON is a 'blinger' and, as I take it, it is the opening gun in your fight for better truck business. . . . You certainly have handled the subject in a masterly way and I congratulate you; more power to you."—T. B. H., Rochester, N. Y.

"I have read with more than passing interest the editorial in your March issue on 'Time to Clean House.' You have raised some very important phases of the situation and it is none too soon to meet these candidly and with determination. In my consulting work for the automotive industry I have from time to time been called in by purchasers to assist them in selecting trucks which they were about to buy. In every case I have been able not only to clear up in the purchaser's mind many doubts which existed as to details, but in some cases to dissipate a pronounced distrust of practically all salesmen because of contradictory statements. It has also been possible to secure modifications of design within the limits available to the truck manufacturer in order to secure trucks which would better serve the operating conditions of the customer, both sides seeming pleased with the results."—C. T. M., Rahway, N. J.

"We consider 'The Time to Clean House' a mighty good editorial. It not only strikes the point, but it expressed the facts. We were wondering if you had this editorial in reprint form and were in a position to supply several copies. If so, we should like to have a sufficient number to send a copy to each one of our 110 branch managers in the United States and Canada."—J. C. E., Chicago.

"We have read your editorial and believe that it is thoroughly well founded. We are glad to see someone who is willing and has courage enough to speak his mind in these times."—E. C. R., Detroit.

"I want to congratulate you upon propaganda of this character. There is no reason in the world why the motor truck industry should not get right down to bedrock and be conducted like any other stable business is. It must come to this eventually and it is needed today perhaps more than it will be at any other time. Anything that can be done in a medium with the influence of POWER WAGON to bring about a better condition in the industry is certainly to be commended."—J. H. C., Cadillac, Mich.

Farm Meeting Calls for Roads

Coördination of the three major forms of transportation so that railways, waterways and highways may each carry the kind of traffic that it can most economically, expeditiously, and efficiently serve was urged by President Harding's agricultural conference held recently in Washington.

"Country highways," declared the agriculturists, "are the farmers' first and principal means of marketing their products. They are the arteries of the economic and social system of the country and on their condition rests the amount of transportation charge that must be added to the gross cost of farm products." The attention of the country was called to the heavy losses now sustained by farmers on account of bad roads and to the economic and social benefits which accrue to them and to the people of the whole country as a result of general road improvement. The conference declared that the farmer ought to be able to haul to markets twice as much and twice as often as he has been able to do in the past and that if the farmer is to help influence the price of his products by not dumping them on the market for fear of unseasonable weather, he must control the condition of the roads to his markets.

To bring about the general improvement of highways and to facilitate the farmers' marketing problem, the conference went on record as being in favor of highway research by federal, state and college authorities to the end that traffic on highways may be regulated according to the facts developed. Congress was urged to continue federal aid for the building of interstate, postal and the farm-to-market roads and to appropriate adequate funds for a definite period so that the states may plan equitable coöperation. The conference urged that every possible effort be made to promote safety of life and limb on the highways and that as economy of transportation depended on well kept highways that all possible safeguards should be placed about the maintenance of the roads.

Realizing that traffic conditions are rapidly changing and that road building is now an important engineering and business undertaking, the conference urged that all partisan or political considerations in such work must be eliminated.

Excessive Truck Taxes Unjust

"There appears no convincing reason why there should be a discrimination against motor vehicles in the matter of taxation, which was never practiced against vehicles of any other kind," says the *Boston Transcript*. "As for the proposal to place especially heavy taxation upon trucks, it should be borne in mind that these are the very vehicles which are the most beneficial to the public at large. They have effected one of the most marked industrial and social revolutions of modern times, comparable with that effected by the railroads. They have created a new system of marketing. They have increased the value of land and potentialities of profit from it. They have revolutionized production speed in all commodities. They, doubtless, should be subjected to taxation on equal terms with other comparable property. Their operation should be reasonably regulated. They serve the whole public, and the whole public, which benefits from them, should be interested in providing good roads for them to traverse. There would be no more justice in making vehicles pay all the cost of roads which they use than in making the people, whose houses were saved from burning, to pay the whole cost of the fire department, or those who directly enjoy the protection of the police force to pay for the maintenance of that force. Good roads are a public work, just as much a charge on the whole public as the police or the schools, or any other department or function of government."

$600,000,000 Spent on Roads in 1921

The Bureau of Public Roads of the United States Department of Agriculture estimates the total expenditure for construction and maintenance of roads in the country in 1921 to be $600,000,000. The sources of this fund are approximately as follows: Motor-vehicle revenue, 19 per cent.; state road bonds, 7 per cent.; local road bonds, 33 per cent.; state taxes and appropriations, 12 per cent.; federal aid, 14 per cent.; county, township and district taxes and assessments, 14 per cent.; and miscellaneous, 1 per cent.

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Combining Rail and Water Transport

By H. T. GLADDING

President, Gladding Express Company, Baltimore

WILL the motor truck and the aëroplane help solve the railway problem of the future by eliminating the unprofitable short-haul freight-train and the costly passenger flyer? This is the substance of a question asked by Samuel Felton, President of the Chicago Great Western Railroad, in concluding a recent article in which he cites European experience, where the use of these two transportation mediums has developed more rapidly than in our own country. As bearing directly upon the first part of the question, an account of the unusual trucking business of the Gladding Express Company, a common carrier serving the eastern shore of Maryland, should be worthy of consideration. This company operates an oil-burning boat of 200 tons, the "Samuel M. Denny," between Baltimore and Centerville, and a fleet of motor trucks on eight routes radiating from Centerville.

Daily at 4 P. M. the "Samuel M. Denny" leaves Baltimore with a load of package freight for a 50-mile trip across Chesapeake Bay to Centerville, a town on the eastern shore favorably located as a distributing point. As the "Samuel M. Denny" plows through the water with her Diesel engine running smoothly, large orange-colored trucks on the eastern shore are steadily making their way from various points along carefully chosen paved routes, all focusing at Centerville. From time to time, these trucks pick up shipments of vegetables, fruits or sea food for the markets at Baltimore or beyond.

The boat reaches Centerville at about 8 o'clock, and the warehouse immediately becomes a place of activity as the freight is unloaded and is wheeled to sections reserved for the different trucks. Then the trucks arrive, and their loads are transferred to the "Samuel M. Denny." By midnight, the boat is starting back to Baltimore with produce that will be on sale by 7 A. M. and the trucks are on their way over Maryland's concrete roads to their respective terminals with all sorts of merchandise for delivery as soon as local business houses open in the morning. In summer refrigerator trucks insure the safe carriage of meats consigned to the various towns served and the delivery in good condition of fruit *en route* to Baltimore. This service is in effect a haul in quantity between important points, with truck pickup and delivery around distributing centers, and such a plan might well be adopted for use by the railroads.

Some explanation of local transportation conditions may be needed to bring out the full import of this service. As the haul around the head of Chesapeake Bay is uneconomical and slow, practically all transportation between Baltimore and the eastern shore, except in the case of bulk freight consigned to interior points, has been by water and the short connecting railways. For a number of years subsidiaries of the Pennsylvania Railroad have been operating a fleet of 23 steamers from Baltimore to eastern shore points. One steamer can serve only a small territory, and frequently carries only a few tons of freight. Overhead is very heavy, and President Samuel Rea of the Pennsylvania Railroad recently informed the Merchants' & Manufacturers' Association of Baltimore that the subsidiary railroad companies controlling the boat lines have been the source of large losses for years. In the case of the Maryland, Delaware & Virginia Railroad Mr. Rea stated that in no year since 1911 have the road and its boat lines earned operating expenses, and that since 1905, more than $1,050,000 has been advanced to keep the company alive. Even with this outlay service has been unsatisfactory. But by extending the motor truck plan of operation to cover the entire eastern shore the number of boats needed would be cut to four or five and profitable business could be developed, with the great advantage to the shipper of direct service to the farm and store.

Each of the eight truck lines in our system serves several towns, and local agents are frequently employed to handle pickup and delivery service with light trucks. In the case of an important point not a terminus of a line a loaded trailer may be dropped off, while the truck goes on. Shipments are picked up at local stations or at the farmer's gate, and it is planned to build receiving platforms at cross-roads. Merchandise for farmers is delivered by local agents, or is left on the return trip in the evening.

An interesting order service was inaugurated recently. Each truck now carries a letter-box, and orders made out before the truck leaves the various towns in the late afternoon or evening may be slipped into the box for delivery to the merchant in Baltimore early the next morning, or for mailing there if addressed to other cities. On the eastern shore the mails close at 4 or 5 o'clock, and letters mailed there before that time are not delivered in Baltimore until the afternoon of the following day.

Anything from a pound of butter to a 5-ton engine is accepted for transportation. From Baltimore groceries and hardware are important classes of merchandise carried. Probably over 90 per cent. of all meat moved from Baltimore to the territory covered is carried by our line. Hundreds of tons of fertilizer were delivered direct to the farm last fall. Returning to Baltimore, the "Samuel M. Denny" will be loaded with all sorts of produce in season —fresh fish, oysters and crabs, strawberries, sweet potatoes, asparagus, and other fresh vegetables, and poultry. The rates and classifications are those used by the railroads. Compact tariff sheets are issued which give commodity and class rates in a convenient form.

The truck fleet for the eight routes at present consist of eleven 5-ton machines, and two 5-ton trailers. More will doubtless be required in the spring. Two of the trucks are equipped with specially built cork and felt lined refrigerator bodies. Two ice-boxes, the full length of these trucks, are placed along the sides just below the top, extend downward about 1½ feet and are 1½ feet wide at the top, the width decreasing to less than a foot at the bottom. Each box holds 200 pounds of ice, and a charge lasts from 24 to 36 hours.

Maryland's excellent state road system furnishes a good hard surface over which to haul—otherwise truck service of this character would be entirely out of the question. Most of the routes are paved with concrete, which is the type Maryland has been building almost exclusively. For night driving this type is especially good, as the roadway stands out in the dark and pedestrians or unlighted horse-drawn vehicles can be seen easily against the light background.

When this company was engaged in regular hauling to New York, tires deteriorated rapidly because of the high crown on the macadam sections of the road, which threw most of the weight upon the inside of the tires. This caused overloading, with consequent heating, hardening and failure of the tires as chunks became loose along the inner edge. With the flat crown on the concrete, tire wear is very uniform and tires last much longer. We find also that there is a marked difference in the likelihood of skidding on different road surfaces, as the tires seem to grip the concrete surface much more firmly than the others.

At Centerville the company maintains a machine-shop and garage, and there each truck is inspected every night. E. Charles Gladding is in active charge at Centerville, and Clinton Gladding, stationed at Cambridge, acts as traffic manager.

While the exact geographical conditions which confronted us will be duplicated in but few other places, the general principle upon which we are operating—long haul in quantity and pickup and delivery by truck —can be applied in many places to advantage, and may point to a means of relieving the railroads of the burden of unprofitable short-haul freight.

The State of Alabama recently passed a $25,000,000 bond issue to provide funds for the construction of a state highway system. The measure was passed by an overwhelming favorable vote. Plans are being prepared by the State Highway Commission to go ahead with the work as rapidly as possible.

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Would Legislate Truck and 'Bus Out of Competitive Field

By HARRY REID

President, Interstate Public Service Company, Indianapolis

MY VIEWS on the motor 'bus and the freight-handling truck show that I am opposed to these transportation agencies as competitors of the electric interurban railway and I feel they should be disposed of by legislation which would result in the regulation of their business by public service commissions or by other constituted agencies, on the same theory that two gas, two electric or two water companies are not allowed to operate in competition, unless this condition prevailed before regulation was provided. I come to this conclusion, believing that interurban business, to be successful, must operate as a natural monopoly, the same as any other class of utility business. To give an illustration of my theory I would call attention to the laws of Pennsylvania, where the Public Service Commission has jurisdiction over the service and rates of these transportation agencies. Before a 'bus or truck line can operate in competition with an interurban company, a certificate of convenience and necessity must be obtained from it.

I am, of course, a friend of trackless transportation where it promises to become the forerunner of an interurban line. In other words, if the extension of an interurban line is urgently desired and if the traffic which will be secured is somewhat in doubt, that is, if there is a reasonable doubt whether it will be profitable, it is possible to have a trial of the "trackless trolley" or motor 'bus, which, in the meantime, will serve as a feeder of the existing interurban line and as an instrumentality in building up the territory. Then, if the travel proves sufficient, an extension of the interurban tracks would be justified.

If trackless transportation is established, its charges should be regulated by proper authority, so no injustice may be done, either to the public, the interurban, or the truck. In addition to regulation of this character, the 'bus or truck should pay a special license tax, not only as a compensation for the damage done to the roads which the interurban helped to build, but also as an offset to special tax burdens placed upon the interurban industry.

I have said that these transportation agencies should be eliminated as a competitor of the interurban. On the other hand, I can readily see how they might come to be of great assistance as cross-country feeders to our lines. As a matter of fact, the company which I represent is coöperating with certain motor 'buses and truck lines operating cross-country to our lines and we are arranging with them at the present time joint tariffs which the Interstate Commerce Commission and the Public Service Commission both have indicated their willingness to accept, naming rates and points which are reached jointly by interurban and truck or 'bus lines, providing the company furnishing the tariffs assumes the responsibility for shipments over the entire route. This can be accomplished by bonding the truck or 'bus line when each joint tariff is filed, so that the company filing the tariffs would be protected fully.

A large amount of high-class tonnage can be created for the interurban and a service can be rendered to the rural districts which will prove of benefit to the interurban company and the inhabitants served. This policy will also tend largely to develop more rapidly the outlying territory. A development of this nature will establish an outlet for farm products from interior points located on truck lines to town and city markets which have heretofore been inaccessible. In turn, such a policy will make it possible for interior points to get their supplies with less effort and smaller expense and operate towards the general development of these rural territories, opening up new fields of industry, which, due to lack of transportation facilities, have been wholly inactive.

Live-stock is being transported to a very considerable extent by the several interurban companies entering Indianapolis. The motor truck may be useful as a feeder to the interurbans in bringing live-stock from the farm to the nearest interurban point and this practice would also be true of dairy products, garden-truck and fruits.

The coördination of trackless transportation with the future service of the electric interurban means a more thoroughgoing development of the territory served and for a much wider scope than has heretofore been possible, but only under conditions, such as I have outlined, can I see any benefit to be derived by the interurban industry from the trackless transportation business.

Trucks Help Proportioning Plant

Prominent among the many changes that have been made in highway engineering practice has been the development of time and labor saving machinery. Any new mechanical improvement, however, must first be able to operate in close unity with other road equipment if it is to work efficiently. And this element of coöperation between various mechanical units, the one factor which lends flexibility to the modern road-building scheme—is the motor truck.

The way in which a motor truck adapts itself to improvements and changes in building and road construction equipment, sometimes even making possible these changes, is sometimes very striking. A Mack dump truck, with a specially constructed body, is loaded by an Erie Aggre-Meter Plant, an automatic device for accurately measuring and loading the materials for concrete road construction work. With a dump truck working in coöperation with such a proportioning plant, the loading process has been changed from an expensively slow one into a quick and economical operation of from 60 to 75 seconds.

Moreover, the effects of this coöperation between the motor trucks and measuring plant are felt in all phases of the work, and particularly at the concrete mixer. This fact was convincingly demonstrated recently on a road job for the Pennsylvania State Highway Department. On this job, the steady teamwork of three Macks and a proportioning plant kept the concrete mixer always operating at the full capacity of the road gang handling the mixture, making possible a speedier fulfilling of the contract with more uniform and satisfactory results.

To facilitate the work further, a specially constructed, 4-compartment dump body, designed with hinged partitions, was mounted on each truck. The bodies permitted the central-proportioning plant to load two, three, or four batches of properly measured material into the truck in one operation. Furthermore, by means of the swinging partitions, one batch was delivered at a time to the mixer hopper. Constantly on the move between proportioning plant and mixer with loading and unloading time cut to a few minutes, these three Macks displayed their ability to transport 192 loads or 770 accurately measured batches of material each 10-hour working day.

Electric Cab on Display

As compared with the electric taxicabs 25 years ago, those of 1922 as exhibited at the Electric Automobile Show in New York present many strange contrasts. In fact the two types have nothing in common except that both are electric. New York's first taxicabs appeared in the late '90s. In design they resembled the horse-drawn hansom cabs and hacks of the day. The driver was perched high above the street and the novelty of riding in a "horseless carriage" brought plenty of business. They were driven by electric motors which secured current from batteries placed under the driver's seat.

The newest design in taxicabs is also an electric, but it does not look much like the car of 25 years ago. The 1922 electric taxicab is built by the Electro Car Corporation. It has an operating capacity of from 60 to 70 miles on a single charge. Although this will be ample for the requirements of city work, provision has been made for the rapid change of batteries in case a 24-hour service should be required. It will be possible to remove an exhausted battery and replace it with a fresh one in a few minutes.

Parish & Bingham Business

The Parish & Bingham Corporation reports for the year ended December 31, last, a total operating deficit of $356,000 against $262,296 in 1920. The net sales in 1921 reached a total of $4,201,124 compared with $9,128,443 in 1920. The cost of sales was $4,037,468 in 1921 and $9,089,813 in 1920, leaving an operating profit of $163,656 in 1921 and $38,630 in the previous year. The deficit after dividends was $356,080 in 1921 and $712,296 in 1920.

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Kansas Railway Uses Rail Motors in Urban Service

SIMILAR EQUIPMENT BETWEEN CITIES

Again the motor truck steps into a new field and again it proves its versatility and adaptability beyond question. For the first time in history, gasolene-propelled trucks have been put into city railway service to replace electric trolley-cars. This installation has been made by the Manhattan City & Interurban Railway Company of Manhattan, Kansas, which recently scrapped its heavy electric cars and equipment and is now operating four FWD rail motors.

A few years ago the idea of operating a motor truck on rails would have been laughed at, yet the chassis for these cars are the same as the chassis used in the standard FWD 3-ton truck with the exception of those changes which are necessary to fit the trucks for rail service. These cars are operating on the same rails over which the electric cars formerly ran and according to the same schedules.

The excessive cost of operating the heavy electric cars for a patronage which has decreased considerably since the war was the reason which determined officials of the Manhattan City & Interurban Railway Company on buying lighter equipment. It cost them between 40 and 50 cents per mile to operate electric cars and they give the public just as good service now at a cost of about 15 cents per mile. But they gained more than simply a reduction in operating costs by installing motor equipment. They reduced the number of their employes, one man operating a car instead of two; they eliminated the expense involved in the operation of a power-plant and three substations; they are able to operate their motor equipment with less noise and less annoyance to the public; they reduced their cost of maintaining their right of way, the new equipment being much lighter and less destructive to the rails than the heavy electric cars; they reduced the liability of damage suits resulting from accidents, which were quite frequent when the electric cars jumped the tracks. Besides all these advantages, this company has done its bit toward beautifying Manhattan through the removal of overhead trolley-wires and poles from the city streets.

Each car provides seats for 32 persons and space for baggage. The cars are well finished inside and afford great comfort to passengers. Some of the other features of the cars follow: 156-inch wheel-base; high-speed reverse gears which enable the cars to go as fast in reverse as they will go forward; locomotive type "cow-catchers"; electric starting and lighting devices; heating systems which utilize the heat from the exhaust; entrance and exit near the front of the car with the door operated by the driver.

In addition to the rail cars the company operates one 'bus on the highways between Junction City and Fort Riley as a feeder to the interurban line. This 'bus looks somewhat similar to the rail cars, having the same kind of body. The weight of the chassis in each case is 7,200 pounds as compared to 60,000 pounds, which is the weight of the heavy and noisy electric cars.

The two cars operating on the city lines average about 95 miles and 500 stops each per day, while the two cars in interurban service average 150 miles and about 250 stops each per day.

Both in the city and on the interurban line between Manhattan and Junction City there are many steep grades and sharp curves in the tracks. At one place the cars travel up a 5 per cent. grade which is 2,500 feet long and another 3½ per cent. grade which is 4,000 feet long. The curves encountered by these cars vary from less than 1 degree up to a curve with only a 45-foot radius.

When the first snow of the winter arrived at Manhattan, citizens were doubtful as to the ability of the cars to operate in the snow without the use of a snow-plow as had been the custom with the electric cars. But all doubt was cleared away when the trucks, with little difficulty, plowed through the deep snow which was drifted in places to a depth of 2 feet.

With the load equally distributed over the 4 wheels and with every wheel a driving wheel, these trucks obtain a maximum amount of traction which makes them particularly well adapted to service over steep grades, around sharp curves and over snow-covered rails such as they encounter in the service on the Manhattan lines.

Regarding the service given by its motor equipment and the cost of operating it, company officials state that the installation is a great success. They also state that not one complaint about the service with the new equipment has been received, which speaks pretty well of the patrons' satisfaction and which goes to prove that service is the secret of universal satisfaction.

Road Transport in England

Railway companies in Great Britain are being offered serious competition by motor transport, which is making great headway and is viewed with considerable alarm by railway officials. High railway rates, an excellent system of highways, and the release of large numbers of motor vehicles formerly used for military purposes, together with the men who drove them, all combined with a winter climate not unduly severe, serve to advance this competition. However, in some quarters its importance is thought to be overestimated, because motor traffic will ultimately be compelled to bear its proportion of taxes for maintenance of the highways; furthermore, doubts exist as to whether any of the motor transport companies are setting aside the proper sums for repair and renewal of vehicles.

The number of road transport undertakings in operation in 1921 was 3,000 with a capital of $585,000,000, exclusive of business men who use their own fleets of motor trucks. A recent press estimate of merchandise hauled by road transport in the United Kingdom in 1921 was 6,000,000 tons.

Urges the Use of Properly Filled Out Caution Plate

JANUARY TRUCK OUTPUT 38% LARGER

At the quarterly meeting of the motor truck members of the National Automobile Chamber of Commerce reports on sales were made which showed that the truck business was improving gradually. In Chicago truck sales had increased 25 per cent. January production was 38 per cent. better than December.

At the general meeting of the truck members it was unanimously voted to adopt the recommendations of the Truck Standards Committee as follows:

1. That the standard caution plate adopted by the Chamber in 1912 is more suitable for present requirements than any other form of plate.

2. That a more general use of this plate should be made and that the space provided for weights should be actually filled in.

3. That the manufacturer should recommend to the state motor vehicle commissioner that no license be issued for a motor vehicle unless weights are properly filled in on the plate at the time of application.

R. O. Patten, truck sales manager, Pierce-Arrow Motor Car Company, proposed that truck sales questions and answers be standardized to give the buying public a more rounded viewpoint of truck utility. It is expected that many of the members will follow out this suggestion.

It was reported that the American Electric Railway Association has been giving considerable study to the possibilities of the motor 'bus. The New England Street Railway Club has already recommended to its members that motor 'bus service is preferable as an auxiliary in many instances. This is believed to mark definitely the turning point of the electric railway industry in favor of 'buses.

Facts presented by F. W. Fenn, secretary, to the members of the Automobile Club of Canada at Montreal and to the Ministers of Highways and Finance at Quebec resulted in the drawing up of a new bill to permit a maximum dead weight (vehicle and load combined) for any truck of 24,000 pounds.

The N. A. C. C. will soon issue a booklet on driver civility. It was felt that a more general understanding of the courtesies of the road would bring about fewer accidents and impress upon motor truck drivers the importance of yielding the right of way to faster moving vehicles.

There were 12,141 more freight-cars in operation on February 23 than on January 15, showing that in thirteen days there was a distinct improvement in the movement of goods. In the first two months of 1922 there has been a decrease in the idle freight-cars in good order of over 200,000. No other figures indicate more clearly the swing of the business pendulum, unless it be the increasing number of motor trucks being purchased.

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Build for Permanence, If You Would Build for Profit

By C. A. VANE

General Manager, National Automobile Dealers' Association

"WE MUST purge this industry of 'circus gyp' and horse-trading methods, if we are to gain the respect and confidence of the public," says Charles E. Doan, president, Doan Motor Company, Toledo, Ohio. Well, who is going to make the start? Here and there over the country a dealer towers mightily above the general field. Here and there are dealers who stand as high in the automotive field as does Marshall Field in dry goods or Tiffany in jewelry.

Marshall Field and Tiffany not only have built a reputation, but they have made more money by following the highest principles of merchandising than any competitors. The same result has been attained in the automotive industry by the dealers who have sought to win the confidence of their customers, who have treated their customers honestly, fairly, given them what they wanted, what they needed and then took care of their wants after their original purchases.

These men in the automotive industry have worked alone, they have been isolated instances, and by the force of their own example they have sought to elevate the standards of the industry and teach a respect and an enthusiasm for the automotive trade that would mean the confidence and patronage of the buying public. They have been badly handicapped because they have been working alone.

"In union there is strength!" They have sought this unification and they are determined that their business, their policies, their methods shall not be injured and blackened by the careless, general characterization of a public that has dealt with those who have been less faithful to the ideal, perhaps wholly unconcerned with the principle that a business must be built for permanence, if it is to be built for profit.

These outstanding dealers have built for permanence. They have built for profit. They have built great institutions and spent hundreds of thousands of dollars to capture the greatest of business treasures, good will, public confidence and trust.

They have come to see that the battle can not be carried on single-handed. They have come to realize that these men who are doing the right things, the necessary things, must work as a unit, solidly together to convince the public and convince it speedily, that the automotive dealer body has some men in it, some institutions in it, who are jealous, not only of the reputation of their concerns but of the business in which they are engaged.

So they have demanded of their national organization, the National Automobile Dealers' Association, that a line be drawn in the industry by which those who are maintaining business upon the highest principles may remove themselves from the slurs and stigmas that have been brought upon the industry by the dealers who will not, or can not, observe the Golden Rule of modern business conduct: "Treat the customer always as if he were your boss."

So the operating plan of the N. A. D. A. has been changed by these men who are demanding the highest principles of conduct from themselves and their associates, to demand the highest principles from all dealers engaged in the industry and to bestow upon those who have "arrived" and who realize the need of business practices, a mark by which they can be distinguished from the "gyp," the "horse-trader" and the "circus performer."

Future membership in the association has been changed to demand that a member in the N. A. D. A. must have been in business not less than two years, must have a first-class credit rating, a financial standing, and a reputation for fair dealing and honest merchandising not only with the fellow dealers of his city but with the buying public as well.

Such a dealer as the one described must make direct application for membership in the national association, he must submit as references not less than three endorsements of his fellow dealers, and then he must satisfy an investigation by a secret membership committee of the association which proposes to find out just what his standing is among the people with whom he does business.

If he is elected to membership he must keep on the straight and narrow path to continue his membership. The association has been made hard to get into and easy to get out of. Reputation is a bubble; prick it and it is gone. Membership in the N. A. D. A. will demand continued adherence to an ideal; the man who slips, who falters, who hesitates between the highest principles of proper conduct and the chance to profit by a shady transaction will find himself divested of his membership.

For the by-laws of the association provide that a member may be expelled from the association for a number of causes which mitigate against the good name of the automotive industry. A member may be expelled for: Insolvency! Habitual failure to pay his just and honest debts! Fraud, committed upon either the association, a member or the public! Publication of false advertising! Misrepresentation of his house policy! Misrepresentation of his merchandise of whatever kind! Conviction on any felony charge! Disparagement or attack upon any competitor or his methods! Loss of financial standing or loss of credit rating!

"Service" will be the watchword of future success in the automotive business. Not the tinkering upon the machine that can be done by any alley repair-shop, but the service that will satisfy the owner. The dealer who is playing only a shoe-string can not perform this kind of service, because his interest in a certain make of vehicle may cease six months after a sale. He will no longer be in business. The public henceforth must be taught that value, not price, is the dominating characteristic in the purchase of a machine and that value can be obtained only in one backed by a manufacturer strong enough to be in business during its life and backed up by a dealer who will be in business when that vehicle comes back, two years, three years, five years afterward, for attention.

How many dealers can give the public that assurance? According to the January 1 figures of the National Automobile Chamber of Commerce there were 38,000 automobile dealers and 25,000 motor truck dealers in the United States. Granting that 60 per cent. of the truck dealers also handle passenger-cars, that leaves 48,000 individual motor vehicle dealers. According to the records of Dun and Bradstreet there are only 8,654 motor vehicle dealers in the United States who have a credit rating of $10,000 and upward. Credit is absolutely necessary to expansion, continuation and prosperity of any business. The business of the world is done on credit, not on cash, and the automotive industry is no exception.

The customer then should be taught to take more interest in the permanence of the factory that built the vehicle and the dealer who sold it to him, than he takes in the wheel-base, the accessories, the control and other mechanical details of construction. The customer must be taught that a machine with a father (the factory) and a mother (the dealer) will produce its maximum benefits only while it has both parents, and that it must not be orphaned, either of its factory or its dealer.

Trainload of Trucks to Coast

"The Prosperity Special," a fast freight-train consisting of 45 cars loaded with more than 100 motor trucks manufactured in Cleveland by the White Company, has arrived in San Francisco. This is said to be the largest single shipment of motor trucks since the war and to mark the resumption of solid train despatching in the truck industry.

Not one of the trucks in the trainload was for "stock." All had been ordered by mercantile firms, utilities or municipalities in various parts of the coast territory. The shipment will take care of only a part of the company's coast orders; consequently another train will be sent out of Cleveland for the West as soon as sufficient trucks have been completed.

In the trainload were trucks of four capacities—¾ ton, 2 tons, 3½ tons and 5 tons. The lines of trade in which they will be put to work indicate the scope of business improvement. Among the lines are wholesale grocers, meat-packers, bakers, department stores, 'bus lines, gas and electric corporations, freight hauling, gasolene and oil delivery, and dealers in furniture, dairy products, ice, flour, lumber and paper.

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Reducing Road Wear Through Tires

By E. W. TEMPLIN

Motor Truck Engineer, Development Department, Goodyear Tire & Rubber Company

HIGHWAY transportation is being recognized as a way of augmenting other present means for transporting goods. It offers a large field when the possible magnitude of the ton-mileage that can be delivered over the highways is considered. The means and methods for transporting freight over the highways are governed by the following factors:

(1) Number of ton-miles of goods to be transported.

(2) Shipping points and destinations.

(3) Kind of highways available.

(4) Types of vehicle most suitable.

(5) Cost of operation per ton-mile.

(6) Rates that should be charged for the service.

The conditions the highway must meet, in addition to the gross load of the vehicles, are the maximum tire load, the pressure per square inch exerted by the tire upon the pavement and, since there are irregularities in any kind of pavement, the value of any impact blow that the tire may exert upon the pavement. Pneumatic truck tires do not in any measure reduce the maximum load per tire, but they decrease the pressure per square inch upon the pavement. They present twice the area of contact on the pavement that solid tires of corresponding capacity present. More important, however, is the fact that the impact blows of pneumatic tires upon the pavement are practically negligible, while solid tires build up impact blows to many times the weight of the wheel load. The truth of this statement is evidenced by the following tests:

A 6-inch solid tire was compared with an 8-inch pneumatic tire, since in practice they are used to carry corresponding loads. Each tire was placed in a beam testing machine and a load was gradually applied so as to depress the tire over a 70-pound railroad rail. Readings of the load and the corresponding depression were taken at regular intervals. Under a 7,000-pound load the new solid tire deflected 0.7 inch, but the corresponding 8-inch pneumatic tire deflected 3.4 inches, or 4.9 times as much. However, for consideration of tire effects upon the highway, the worn solid tire should be the one considered. A three-quarter-worn solid tire about 1 inch thick depressed only 0.3 inch under a 7,000-pound load and the corresponding pneumatic tire depressed 3.4 inches, or slightly more than 11 times as much. These same tests were repeated with a 12-inch solid tire against a 12-inch pneumatic tire. It was found that practically the same proportions hold.

A. F. Masury has taken advantage of the Novograph motion-picture machine to study the depression of pneumatic as compared with solid truck tires. The very ingenious method of having the trucks leap into the air and come down against the pavement was used. This without doubt introduces the most extreme stresses. In his conclusions he compares two trucks of the same capacity and design, one equipped with presumably new solid tires and the other with pneumatic tires. Each had the same amount of load and each attained the same speed at the leap. The force with which the solid-tired truck struck the ground was 14,336 pounds for unsprung parts as against 4,624 pounds with the pneumatic-tired truck. The force from the sprung parts was 13,014 pounds for the solid and 9,282 pounds for the pneumatic-tired truck. The deflection of the pneumatic was 4.5 times that of the solid tires. This checks closely with the test showing 4.9 times as much deflection for a pneumatic tire as for a new solid tire. If Mr. Masury had made his trials with worn solid tires, he would, no doubt, have found that the pneumatic tire depresses about 11 times as much as the worn solid tire; therefore, the worn solid tire introduces enormous stresses into the structure of the highway pavement.

Still another class of tests is now in process and has an important bearing on this question. The tests are being conducted by the Bureau of Public Roads of the Department of Agriculture, under the direction of A. T. Goldbeck and E. B. Smith. They are made by running various trucks over a certain stretch of highway and artificial means are provided for causing the wheels to drop given distances. The force of the impact on the road is measured by the compression of standardized copper cylinders. In all but one case the test was made on the same type of truck equipped first with solid and then with pneumatic tires. In the test on the 5-ton capacity truck a chain-driven solid-tired truck was run against a truck of the same make equipped with pneumatic tires but driven by a double-reduction gear. This introduced some difference in the weight of unsprung parts, but it was noted in each case. The conclusions that can be drawn from these tests are that

(1) With solid tires the force of the impact increases rapidly with an increase in speed; whereas with pneumatic tires the force increases only slightly with a large increase in speed.

(2) Pneumatic tires give only one-third to one-fifth the impact force of solid tires.

(3) A 5-ton truck on pneumatic tires can travel 24 miles per hour with the same impact effects that a solid-tired truck having new tires will cause at 8 miles per hour.

(4) The value of the impact force with pneumatic tires is only from 1,000 to 1,500 pounds greater than the wheel load. With the worn solid tire the impact force became 38,000 pounds greater than the wheel load of 7,000 pounds at a speed of only 10 miles per hour over a drop of 2 inches, in the test of a 3-ton truck.

It appears, therefore, that we have found definitely the cause for the destruction of our highways. Without doubt, if the highway engineer is asked to design a pavement to carry solid-tired trucks, he necessarily must consider the forces introduced by the worn solid tire as the maximum force which the pavement must withstand. Also, if he designs a highway to carry pneumatic-tired vehicles, he should be able to design one that will cost much less money than one designed to carry solid-tired vehicles. I have serious doubts if this country, wealthy as it is, can afford to build properly the highways required for carrying motor trucks equipped with solid tires, especially when the enormous stress introduced by the worn solid tire is taken into consideration.

In regard to the state of development of the pneumatic truck tire and the average mileage secured by its users, the following table gives an analysis of 500 trucks and covers the average mileage secured:

Size of tire. Inches.	Carrying Capacity, Pounds.	Average Mileage.
6	2,200	14,026
7	3,000	14,791
8	4,000	12,782
9	5,000	12,028
10	6,000	11,317
12	9,000	Still experimental

It is generally conceded that pneumatic truck tires will not withstand overloading successfully. The matter of introducing the larger sizes, 10 and 12 inches, introduces new problems, including those of service, availability of necessary air-pressure and the disposition of the driver in the matter of taking care of the equipment. The 10-inch tire is giving very satisfactory service where it is properly handled, although it is a heavy and costly tire. The 12-inch tire is giving very gratifying results from the mileage standpoint, but it appears to be too high a tire, too heavy and too costly to give general satisfaction. On this account we feel that there is good reason for experimenting with the application of four small-size tires to replace the two 12-inch rear tires. Since there are many objections to the use of dual pneumatic tires in the sizes above 5 inches, applying the tires in tandem seemed advisable. We therefore constructed a motor truck throughout, to determine the practicability of this kind of tire application. This is a pneumatic-tired 6-wheeled truck of 5-ton capacity. Brief specifications are given below.

Wheelbase.—From the center of the front wheel to the center between the two tandem rear wheels, 180 inches.

Tires.—Pneumatic all around, size 40x 8 inches.

Engine.—Four-cylinder 5x6-inch Hercules, Model T-3; 40 horsepower (N. A.

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C. C.); 3,200-pound-inch torque at 1,200 revolutions per minute.

Ignition.—Philbrin.

Radiator.—Modine Spirex.

Transmission.—Brown-Lipe, Model 60-UPP and auxiliary.

Clutch.—Brown-Lipe, Model 60, multiple-disk.

Speeds.—Six forward; two reverse.

Gear Ratios.—Low, 82.0 to 1; second, 35.7 to 1; third, 23.2 to 1; fourth, 20.1 to 1; fifth, 10.0 to 1; sixth, 5.8 to 1; low reverse, 99.5 to 1; high reverse, 28.4 to 1.

Rear Axles.—Two, Standard Parts, Model 603; worm-drive arranged in tandem; ratio 5.8 to 1. Equipped with four 21-inch diameter brakes of 5½-inch width; in pairs, 2¾ inches wide.

Fuel and Oil Capacity.—Gasolene, 67 gallons; oil, 10 gallons.

Turning Radius.—35 feet.

Chassis Weight.—8,500 pounds.

Normal Speed.—25 miles per hour.

Maximum Speed.—In tests under full load on a level road, 45 miles per hour.

Body.—Haskelite plywood, weight 2,000 pounds. Loading compartments 15 feet long, 6 feet high, 7 feet wide; contains sleeping compartment, toolbox and compartment for two spare tires and other parts; sides and partitions, 5/16 inch thick; roof ⅜ inch, covered with 4-ounce duck.

The mileage obtained from the different trucks built is given in the table following:

Truck No.	Miles Operated.
X-1	12,000
X-2	10,000
X-3	5,000
X-4	900
X-5	Now being built

The chain, worm and internal-gear axles of these trucks are now being tested.

This new type of truck is offered as a solution of the problem of suitable pneumatic tires on trucks of 5-ton capacity and upward, where

(1) Greater speeds than those advisable with solid tires are desired.

(2) Greater protection to the merchandise carried is necessary.

(3) High speeds and heavy loads will not work injury to the roads.

(4) The comfort of the driver is a consideration.

(5) A low center of gravity is desired.

(6) Safety demands additional braking capacity.

(7) Bad roads now interfere with economical operation.

(8) Simplicity of tire change, low tire cost, economical operation and a broadening of the field of highway transportation are necessary.

Two types of spring suspension are being used in our experiments. One consists of a single spring on each side of the chassis; it is inverted and pivoted to the chassis frame and rests on spring bolts in brackets fastened to the axle housing. The axles are held in place by crossed tie-rods, which permit the lengthening and shortening of the spring. This type is giving satisfactory results.

The other type consists of two springs on each side of the chassis frame. These are bound together and pivoted to the chassis frame. This construction does not involve the tie-rods but does require that the springs be fastened pivotally to the axles, to permit the necessary flexibility for the latter when an irregular road contour is encountered. This general method of pivoting the rear-axle assembly gives unusually good riding qualities.

How the truck steers around corners is hard to explain. The high pneumatic truck-tire section permits the tire to deflect sidewise and it is thus allowed to take the curve gradually without slipping and wearing the tread. We have not worn out any tires on this 6-wheel truck as yet, but the condition of the tires now in use indicates that we can expect 10,000 to 12,000 miles of service from the rear tires.

When operating this truck alone with a 5-ton pay load, a total weight of 21,000 pounds, over the brick highway between Akron and Alliance, Ohio, a distance of 120 miles, the average speed was 23.9 miles per hour and the average gasolene consumption 6 miles per gallon. When operating this truck with a trailer attached, each vehicle being loaded with 5 tons and constituting a total pay-load of 10 tons or a gross load of 37,000 pounds, over the same highway and a distance of 125 miles, the average speed was 16.8 miles per hour and the average gasolene consumption 2.8 miles per gallon.

These performances indicate good possibilities for attaining a 48-hour motor-truck express service between Akron and New York City, the distance by highway being 500 miles. The present express rate for goods shipped from Akron to New York City is $2.84 per 100 pounds, or $56.80 per ton. Therefore, a 5-ton truck that can operate within 56.8 cents per mile and average 20 miles per hour can, at express rates, give better service than that of the railroad express company.

From this we may conclude that

(1) Past experience and recent tests prove that the solid-tired truck is an extremely uneconomical factor in highway transportation, from the fact that it is unquestionably destroying present expensive highways; and that it will destroy any highways constructed in the future, unless they are built about five times the present strength, at about three times their present cost.

(2) Pneumatic truck tires are proving their practicability.

(3) It appears possible to design a vehicle that will have many mechanical advantages and only require a pavement designed and built for carrying and withstanding the shocks of a loaded 9-inch pneumatic truck tire. This combination of vehicle and highway would permit a pay-load capacity of from 5 to 7 tons. Even with this heavy tonnage capacity this type of truck would have less of a destructive effect upon the highway than present light solid-tired trucks, and it would be very economical to operate from the standpoints of fuel consumption, tire, maintenance, and highway costs.

The 6-wheel truck referred to has been tested by the Bureau of Public Roads with the following results:

(1) The impact delivered by the 6-wheel truck loaded with a 6-ton pay-load was equal to the impact delivered by an ordinary 2-ton truck having a 2-ton pay-load.

(2) The bearing pressure upon the highway pavement is at a maximum under each of the rear wheels, giving a soil pressure of approximately 3 pounds per square inch, maximum, with a 6-ton pay-load as against 6 pounds per square inch for an ordinary 5-ton truck with a 5-ton pay-load.

(3) The maximum impact delivered by the 6-wheel truck with a 9-ton pay-load was approximately 10,000 pounds, as against a maximum blow of possibly 70,000 pounds delivered by an ordinary 5-ton truck with a 7½-ton pay-load.

Shipping Walnuts by Truck

The profit that can finally be realized on any product, whether the article is manufactured or grown from the soil, depends largely upon the economy of the transportation scheme involved in getting the commodity to market. Particularly is this the case when shippers at a great distance from the ultimate consumer have to compete with producers more fortunately situated, for then the market price of the product can not be materially increased to cover the added transportation costs.

With Eastern markets over 3,000 miles away, California walnut growers recently found that their old method of shipping by rail across the continent, while obviously the quickest means they could employ, so reduced the net profits on their crops that a more economical transport medium would have to be found. In order to stimulate sales in the East and also to meet the competition of nut growers of the South, the selling price of their product had to be placed at an inviting figure that obviously could not be made to absorb high shipping costs.

So, following the general plan so successfully inaugurated by the California Fruit Growers' Exchange, which is to-day marketing the famous Sunkist oranges and lemons in European countries by way of motor truck and Pacific steamers instead of by rail to Atlantic ports, they turned their attention to the Panama Canal. Under the direction of the California Walnut Growers' Association, from 500,000 to 1,000,000 pounds of walnuts were shipped on every steamer leaving Los Angeles harbor for an Atlantic seaport. From their main packing-houses located in three different counties adjacent to Los Angeles, motor trucks were employed to gather the sacked walnuts. Each day long processions of these trucks delivered over a million pounds to the wharves at Los Angeles. From this point the nuts were lowered into the holds of the vessels, and then the long trip to Eastern ports was begun.

This truck-steamer method not only has brought about huge economies in the shipment of California's annual crop of over 52,000,000 pounds of walnuts, but has emphasized the value of the motor truck as an indispensable link in any transportation chain.

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Business for Parts Makers

Parts manufacturers are enjoying increasing business no less remarkable than that of most vehicle producers. The Continental Motors Company has regained its former volume of business and is adding new plant facilities. During the past few weeks orders for truck engines have exceeded passenger-car engine sales. The normal capacity of 150,000 motors a year is being increased to 285,000 annually. The truck engine business is now 30 per cent. of "normal" and President Judson declares prospects are that April output will be twice that of April, 1921.

Edmunds & Jones are operating 30 per cent. above January, are increasing forces daily, and report that April business will be 10 per cent. better than March. The Hall Lamp Company's Detroit plant reached normal production early in February. March output is 40 per cent. greater than February and orders in hand indicate April production will run from 50 to 60 per cent. above March.

The Timken-Detroit Axle plants are making 100 per cent more axles than in January. The passenger-car axle division, with capacity for 12,000 axles a month, will turn out 10,000 in March, and similar quotas in April and May. The truck axle division has not felt an equal response, but the combined output is running in the neighborhood of 1,000 axles a day.

Market in Norway

Norway offers a potential market for American automotive products. The outlook at present is not promising, however, due to the general business depression and the high rate of exchange of the American dollar.

The number of motor vehicles registered in Norway increased from 972 on October 15, 1913, to 16,640 on October 15, 1921. Up to 1918 the number of vehicles increased slowly but steadily. After that date the increase was more pronounced, rising from 4,700 to 7,639 in 1919, then to 13,700 in 1920, and to 16,640 in 1921. The following are the various kinds of motor vehicles registered in Norway on October 15, 1921: Passenger-cars, 18,050; trucks and delivery cars, 3,072; and motorcycles, 5,518.

The total mileage of main highways in Norway amounts to 13,422 kilometers, 10,834 of which are entirely open, 1,857 partially closed, and 735 (5.5 per cent.) entirely closed for motor traffic. Roads other than main highways total 21,843 kilometers, of which 8,129 are open and 2,036 are partially closed; 11,678 kilometers (56 per cent.) are entirely closed for motor traffic.

In 1915 there were 95 'bus lines in Norway, operating 161 cars over a total length of 3,577 kilometers, as against 327 lines in 1921, operating 627 cars over a total length of 9,968 kilometers. Car kilometers driven during the 1921 season totaled approximately 6,037,906. For carrying mail the 'bus lines received from the government about 70,085 crowns in 1915 and 354,730 crowns in 1921. The prices of passenger tickets ranged between 3.5 and 27 ore in 1915 and between 10 and 50 ore in 1921.

Two Trucks $6,000 Cheaper Than Horses in Year

By P. H. MULLEN

Vice-President, Mullen & Meyer, New York City

MOTOR trucks have made themselves the standard for our heavy work. We are in the wholesale dairy business, supplying restaurants, stores, soda fountains, etc. Our territory extends from the East River to the Harlem River, and from 86th Street to 181st Street.

When we started our business some years ago, we used horses exclusively for delivery; but as our business increased we took in more territory, and the horses proved unsatisfactory for the long hauls and heavy loads. We are still using 10 horses on short hauls, but have supplemented them with two light cars and two 2-ton trucks.

One of the trucks was 5 months old in February, 1921, and the other 22 months. These two trucks—both Garfords—leave our plant early in the morning for the freight-station at 138th Street and 12th Avenue, where they get their load of seventy 10-gallon cans each. Then they start on their rounds, making about 45 stops, and returning empty to the plant. After the driver has had his breakfast, he starts out on a second trip to collect the empty cans and the money. He returns shortly before noon, when his work is over for the day. On account of his responsibility as a collector, the driver gets more than the usual wages.

We have found the trucks very economical to operate, besides being very dependable under all conditions. Truck No. 1 costs $13.34 a day, 53.59 cents per mile, 9.52 cents per can, and 1.53 cents per can-mile. Truck No. 2 costs $13.55 a day, 53.34 cents per mile, 9.68 cents per can, and 1.52 cents per can-mile. In spite of their many stops, both trucks are getting 5 miles per gallon of gasolene.

These are very satisfactory operating costs, and are much lower than our costs would be with horses. We should require at least 2 teams to replace each truck. Since each team with driver would cost $15.00 a day, the total cost would be $30.00 a day against an average of $13.45 a day for a 2-ton truck. The saving per day would be $16.55, which amounts to $6,040.75 a year for one truck, or $12,810.50 a year for the two.

One of the 2-tonners has hauled in all kinds of weather, 365 days in the year, for 22 months, without having been laid up for a single day, and with only 47 cents for repairs. When we needed a second truck, we naturally would consider only one of the same make because of the excellent performance of the first one. The second has proved equal to the first. It has operated at no greater cost, and has not yet cost us a cent for repairs.

OPERATION.

Days operated	669
Miles traveled	16,640
Miles per day	24.9
Miles per gallon of gasolene	5
Miles per gallon of oil	133

AVERAGE COST.

Cost per day (including driver)	$ 13.3355
Cost per mile	.5359
Total cost for period	8,918.00

ITEMIZED COST.

Driver cost per day	$6.44
Depreciation per mile	.0758
Maintenance and repair:	
Actual, total	.47
Actual, per mile	.00
Estimated, per mile	.0264
Tire cost, actual, per mile	.0180

Truck Situation in Australia

There are still plenty of horses in Australia (2,500,000 in 1921), but their use is confined to heavy trucking and to herding cattle and sheep. The distance of the "stations," or ranches, from town, the size of the pastures, and the flatness of the country make the motor vehicle the most economical method of covering a property, especially as in ordinary weather it is not necessary to stick to a road. The country roads are natural dirt roads and are ordinarily good for motoring, although "bogging" is a common experience after a heavy rain. There are about 43,000 miles of paved or macadam and 160,000 miles of natural-surface roads, or a total of approximately 200,000 miles of road in the commonwealth, about half of which are in the State of New South Wales.

The high initial cost and high cost of operation, together with the light roadbeds, have so far prevented any extensive use of motor trucks. A mistaken impression as to the economy of horse transport is probably the greatest barrier to the spread of automotive carrying. The average rural operator has not investigated the comparative expense of horse versus truck very scientifically and can seldom tell just what it costs him to transport his products by wagon. There is little doubt that, with roads improved to the point of withstanding heavy traffic in all weathers, the motor truck will win its way in Australia. This is the first requisite; the second is wider education as to the value of motor transport; the third, greater technical knowledge in the rural districts, where the number of men who can now operate a truck is small.

Trucks are used in fair numbers in Sydney, the undulating streets of which are hard on horses; but they are not used to any extent in the better paved streets of Melbourne, Adelaide, Brisbane, Perth, and other large cities, the initial cost proving the chief objection.

During 1919 Brazil imported 4,537 automobiles and trucks valued at $3,894,979. Of that number 4,438 came from the United States and were worth $3,784,420. In 1920 the total number of machines imported was 9,914 worth $11,091,891, of which the United States supplied 9,068 valued a $9,461,279. Germany sent 204, France 224, Great Britain 107, and Italy 131.

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Fruit Delivery Over 70-Mile Route in 3½ Hours

By FLOYD RAYMOND
Raymond Brothers, Minneapolis

SEVENTY miles north of Minneapolis is St. Cloud, one of the good business towns of Minnesota. Across the Mississippi some three miles further is Sauk Rapids. Between these and Minneapolis are Big Lake, Becker and Clear Lake. The Twin-City merchants found much business in these towns but shipping conditions have been against them.

The freight conditions in Minneapolis and St. Paul are peculiar. Freight outbound is taken in at the local freight-depots, loaded into cars, these cars taken to the Midway Transfer between the two cities, sorted and reloaded into cars for the various roads. Freight shipments are two days getting out of either city.

Rural motor freight routes have solved this problem and are now running in every direction. We took over the route between Minneapolis, St. Cloud and Sauk Rapids last May, placing a 2½-ton Selden truck in the service. Freight loaded in Minneapolis will be delivered in St. Cloud within 3½ hours. This shows the advantage of the motor truck over the Railroad service—less than 4 hours compared to more than 2 days.

This truck makes 4 round trips one week and 3½ the next, with an average load of 4 tons. The body is so built that it will haul fruit the year round without freezing. Our usual load going up is fruit, which must be handled speedily and carefully. Coming back much of our load is paper from the St. Cloud mill.

We started this run in May, 1921, after others had failed with the route. Now it is frequently necessary to send up four trucks in a day to take care of the business. From May until November 1st there was a 17-mile detour at the other end, which made the travel bad, as this part of the country is very sandy and rough. Since then it has been much better.

This 2½-ton truck hauling 4 tons makes the round trip in good weather on 16 gallons of gasolene. During our recent snowstorms, it never ran higher than 20 gallons to the trip—almost 150 miles. The driver uses a gallon of oil to the trip, but he is a great believer in lots of oil and is using more than is necessary.

The greater part of our loads going up to St. Cloud is fresh fruits and vegetables. Of course there is great danger of freezing, and our loads must be well protected. But so far we have had no loss. The floor of the truck is covered with four layers of compo-board, while the sides are also reinforced against the cold. Midway in each side is an opening to facilitate unloading. These two openings, as well as the rear end, are protected on the inside by heavy all-wool blankets hung as curtains, and strapping to the stakes. Outside the stakes are heavy canvas curtains which strap to the sides.

The driver's cab is contained in the body and is of the all-weather type, thus protecting the driver from the cold. Especially on such trips a good careful driver is a wonderful help and we believe in making it comfortable for him.

We have taken over this business and intend to stay in it. This means we must constantly give good service and with the help of our truck we will do it. Recently we joined with other rural freight lines in forming one central terminal. This will afford better service to our customers at the Minneapolis end.

Our customers have interesting things to say about truck service. The Northwest Tablet Company of St. Cloud had some business in the Twin Cities but the freight line greatly increased it. F. A. R. Moore, manager of the company says, "During the fall of 1919, the freight shipments were so slow from St. Cloud to the Twin Cities, that we were obliged to start a truck service, in order to give our customers prompt delivery. At that time we thought it would be temporary, and expected to go back to railroad shipments as soon as the congestion was relieved, but our customers were so delighted with truck service that our entire Twin City business is now served by trucks. It has resulted in a greatly increased business in the Twin Cities. It is quite evident to us that motor truck transportation is here to stay.".

The Gale Company is another enthusiastic shipper via motor truck. Here is Mr. Gale's opinion: "We have been in the ice cream, fruit and fresh vegetable business a long time, and have a large volume of business in St. Cloud and the surrounding towns. We get most of our supplies from the Twin City markets, and try to give our customers the very best service possible. Motor transportation is a fine thing indeed and we are glad to adopt it when properly organized. One of the big features is the promptness in getting our goods to us, another is the small amount of handling required, as well as the careful handling. The trucks have our goods here after about 3½ hours in transit, and they are in much better shape. This quick delivery enables us to give our customers much better service and better goods without having to repack. We are at present serving many towns around St. Cloud from this point and we can give the inland towns and in turn the farmers, fruits and fresh vegetables the year round. I hope in another year, with the road work being done, we will have motor freight lines running further out across country which will extend our field of operations even further."

One of the biggest dealers in fruits and fresh vegetables in Minneapolis is the Gamble, Robinson Company. At St. Cloud it has a branch establishment of which P. J. Long is manager. It too profits by the motor truck freight line, as Mr. Long says, "Our fresh vegetables and fruit are shipped to us from the main store in Minneapolis. It is important that we get these products in short time after leaving the Minneapolis house and they must be in best condition. The motor freight line has proved a boon to us, for we get our goods within 4 hours after loading. When they arrive our orders are in and the truck quickly delivers them for us. There is no delay, no spoilage—and many satisfied customers. A well operated freight line is a great thing for any community, and I know all other St. Cloud or Twin City shippers heartily agree with me."

These men know, for they are the shippers, the customers of the freight service.

Coal Dealer Uses Tank Truck

In order further to economize on its motor truck maintenance plan that has already gained a widespread reputation for efficiency, the Consumers Company of Chicago has recently adopted a novel idea which has advantages that can no doubt be applied to successful use by other large motor truck operators.

A special gasolene supply truck having a capacity of 820 gallons has been installed as permanent supplementary equipment. It consists of a standard gasolene tank body, such as used by oil distributing companies, mounted on a 2-ton Mack chassis.

The economies available to the Consumers Company through the use of this truck are obvious when it is considered that the gasolene that is used by its fleet of over 150 trucks now comes direct from the refinery in railroad tank-cars at a substantial saving in cost. Two mammoth storage-tanks, having a combined capacity of 21,000 gallons, are located at one of the company's yards and here the fuel is transferred from the railroad tank-cars on arrival. The new tank truck is loaded from these storage-tanks and hauls the gasolene to the various garages and yards.

The tank body was designed and built in one of the Consumers Company's shops, and in both appearance and effectiveness it is a very creditable unit of equipment.

Shuler Interests Consolidated

The Shuler Axle Company, of Louisville, Kentucky, has acquired the entire assets of the Shuler Axle Manufacturing Company, and is already in operation for the production of front axles for motor trucks, trailers, tractors, 'buses, etc. W. F. Robertson, of Cincinnati, president of the Robertson Steel & Iron Company, is president of the Shuler Axle Company. W. H. May of Louisville is secretary and treasurer.

The Shuler Axle Company is beginning operations with a paid-up capital stock of $150,000. The line of front axles which was made by the Shuler Axle Manufacturing Company will be continued, and plans have been completed for additions to the line. An active manufacturing program is under way. Frank A. Shuler will continue to act as general manager of the Shuler Axle Company. Harry W. Helms has been retained as sales manager.

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Railways and 'Bus Lines Must Unite

By EZRA L. WHITMAN
Member, Maryland Public Service Commission

THE United Railways and Electric Company of Baltimore had an absolute monopoly of the transportation business of that city until the advent of the "jitney" 'bus in 1915. The first "jitney" 'bus to make its appearance on the streets of Baltimore was operated by a woman, and was placed in service in February, 1915. Before six months had elapsed certain streets leading into the heart of the business section were literally overrun with "jitneys."

The pioneers of this field of transportation had no knowledge of the requirements of the business in which they were engaged. In the main the owner of the 'bus was also the operator, and he made no effort, and probably was unable, to determine whether or not he was operating at a profit. The operator knew that he was taking in more cash, in the way of fares, than he was expending for gasolene, garage hire and other current costs of operation, and drew the natural, though erroneous, conclusion that the difference between the income and the outgo represented the return to him for his services and his investment, and promptly spent it. Alas, when the tires of his 'bus were worn out, he found that he had no money left from his operations with which to replace them. The first of the year rolled around, and he had to borrow money to pay for his license for the new year. If he happened to be able to weather these minor difficulties, his real trouble came when his 'bus had to be replaced. It was then that he realized that something, he knew not what, was wrong with his accounting and financial systems. In all likelihood, he had never heard the word "depreciation," or the term "depreciation reserve," and he had no conception of their meaning. He either dropped out, or borrowed money with which to buy a new 'bus.

Aside from a few scattered 'buses operating in various sections of the city, the operations of the "jitneys" were confined to one line of a number of 'buses, on Charles Street, the main north and south street of the city, and to a number of individual 'buses on Fayette Street, one of the principal east and west streets. The street-railway company, fighting fire with fire, or rather 'buses with 'buses, started a competing line on Charles Street, and when the independent line had been forced to retire from the field, the company likewise sought permission to discontinue its service. This permission the commission has refused to give, although according to figures submitted by the company the line has always been operated at a loss.

The Fayette Street line of independent 'buses continues to operate, the commission restricting the number of 'buses on this route to 33. There is always a waiting list of applicants who are anxious to secure permits for this route. I might say in passing that the service furnished by some of these individual operators is so poor that, if a large corporation attempted to give the same grade of service, our commission would undoubtedly receive strong and numerous protests from the people who use these 'buses with vigorous demands for improvement of the service. While the commission is giving these lines the closest supervision permitted by its limited force, and is endeavoring to require the operators to maintain their operating schedules, it finds it almost impossible to prevent the individual operators from discontinuing their trips when business is slack, resuming operations when traffic is brisk. In other words, some of these operators desire to take only the "cream" of the traffic during the peak periods, and are not concerned with their duty to the public of furnishing safe and adequate service at all times and hours.

The Public Service Commission of Maryland was given jurisdiction over "jitney" 'buses by an act of the general assembly in 1914, but the mushroom growth of the "jitneys" in 1915 clearly demonstrated that, if the commission was to exercise an effective control over this form of transportation, it must be given more direct and summary power to enforce its rules and regulations. The result was that in 1916 the general assembly enacted an amendment to the act requiring the owners of motor vehicles engaged in the public transportation of persons and property over fixed routes and on regular schedules to obtain permits for such operation from the commission, and also give the commission the power to prescribe and enforce rules for the operation of such vehicles.

Until within the past year the attitude of the local street-railway company, as well as of various other established transportation companies in the state, was first that of *laissez faire,* the companies probably believing that the ruinous competition between the 'buses and the lack of proper management and application of business principles would soon result in the failure of all those engaged in this new form of transportation, and that the monopolies previously enjoyed by the several railway companies would be restored.

The Maryland commission is convinced that the transportation needs of any city can be served best by permitting one company to maintain a monopoly. Many railway companies seem to have jumped to the conclusion that the motor 'bus has no place in the transportation system of a city, and consequently have failed to make the necessary studies to determine just how 'buses can be used to advantage, as supplementary to or extensions of the existing electric railway systems. The 'bus has been used with success in Europe for a number of years and that it has a legitimate place in urban transportation in America is the sincere conviction of the writer and his associates on the Maryland commission. The problem is that of determining its place, and then keeping it in its place.

The railway companies now are coming to realize that their original policy of "hands off" was ill-advised, and that they must recognize the motor 'bus as a real, and probably permanent, competitor. In Baltimore the Fayette Street 'buses are collecting about $600 per day, and practically every dollar of this money is a dollar lost to the street-railway company. We find the president of one of the largest and most substantial railroads of the country complaining of the competition of the motor trucks and 'buses, particularly on the branch lines. How much better it would have been if the railroad operators had met the situation squarely when it first arose, and had had the vision to plan for the future, using the motor vehicles as auxiliaries and feeders to the rail lines instead of allowing them to become competitors.

Two years ago the limits of Baltimore City were extended, so that at the present time the area of the city is three times as great as it was before annexation. There are a number of suburban electric railway lines running through the territory of the new annex, but at the same time there are a number of growing sections which are without means of transportation. These sections would develop much more rapidly if there were adequate facilities for transportation, and property values would increase to the immediate benefit of the property owners. The city and state would share in this increment by reason of additional taxes upon the higher assessed valuation.

THAT the people of these growing sections are entitled to some means of transportation practically is conceded by all concerned. In some instances motor vehicle operators are willing to furnish service of a kind provided they are permitted to bring their passengers into the center of the city. This permission the commission is not inclined to grant for several reasons. It would result in a paralleling of the lines of the railway company, sometimes for several miles through a sparsely settled suburban community, and would also result in increasing still further the congestion in the down-town section. It also has been the experience of the commission that while such lines, in order to gain access to the city, are willing to agree that they will not solicit or handle local passengers, they soon forget the agreement and are not averse to augmenting their revenues by picking up local passengers. At the same time the commission must secure service where it is required, and if the railway

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company can not or will not furnish such service, the independent 'bus lines must be permitted to operate.

Several months ago the residents and the owners of property along one of the main highways leading to the city sought the aid of the commission in securing for them transportation service to and from the city. A survey of the situation developed that it would not be feasible at this time to construct a line of railway to serve this section, due to the high cost of track construction and the comparatively small amount of traffic which would offer. The commission and the railway company then turned to a study of the possibility of using either motor 'buses or "trackless trolleys" to take care of the needs of the community in question, and it was determined that the "trackless" trolley would best serve the purpose. The following figures show the approximate capital investment, the fixed charges and the operating expenses for a "trackless trolley," 'bus line and single-track electric railway line for serving the territory under consideration. These figures are based upon such costs as were available to the commission and are probably sufficiently correct for purposes of comparison:

"Trackless Trolley."

Investment:	
6 miles overhead construction @ $5,000 per mile	$ 30,000
3 'buses @ $10,000 each	30,000
Total investment	$ 60,000
Annual Costs:	
Fixed charges—	
Interest on $60,000 @ 8%	$4,800
Depreciation on overhead @ 5%	1,500
Depreciation on 'buses @ 15%	4,500
Total fixed charges	$ 10,800
Operating Costs:	
312 miles per day at 22 cents per mile times 360 days	$ 24,600
Total annual costs	$ 35,400

'Buses.

Investment:	
3 'buses at $6,000 each	$ 18,000
Annual Costs:	
Fixed Charges—	
Interest @ 8%	$1,440
Depreciation @ 15%	2,700
Total fixed charges	$ 4,140
Operating Costs:	
312 miles per day at 35 cents per mile times 360 days	39,300
Total annual costs	$ 43,440

Electric Railway.

Investment:	
6 miles track and overhead at $35,000	$210,000
3 one-man cars at $6,000 each	18,000
Total investment	$228,000
Annual Costs:	
Fixed Charges—	
Interest @ 8%	$17,240
Depreciation @ 5%	11,400
Total fixed charges	$ 28,640
Operating Costs:	
312 miles per day at 20 cents per mile times 360 days	22,450
Total annual costs	$ 51,090

The commission suggested to those interested in securing transportation in the community under consideration that they confer with the officials of the railway company. As a result of this conference the railway company submitted a proposal to the officials of the improvement association of the neighborhood, calling for the property owners to guarantee the entire operating expenses, depreciation and interest charges, so that the company would not be subjected to any possible loss in the operation of the new lines. As a counter-proposal, the representatives of the improvement association suggested that they buy $10,000 worth of tickets a year from the railway company, thereby guaranteeing at least a revenue of $10,000.

Not being able to reach an agreement, the improvement association carried on negotiations with one of the best managed 'bus lines in the state of Maryland, and this 'bus line agreed to run 'buses over this route, provided the commission would permit the 'buses to run parallel to the street-car lines to the center of the city. Not being willing to grant this permission, the commission finally called together all the interested persons and pointed out to the railway officials that inasmuch as they have been granted a monopoly of the transportation system, there were certain obligations which the railway company should meet in the way of furnishing necessary transportation. It was also pointed out to the property owners that they would largely benefit by the installation of the transportation line, and if they had faith in the development of their section that they should be willing to assume responsibility for at least a large part of the losses of the railway company during the development years.

As a result of this conference it was finally agreed that the improvement association would endeavor to raise sufficient funds to guarantee the railway company against losses up to $10,000 for the first year, $7,500 for the second year and $5,000 a year for the next succeeding three years. If the traffic develops so that there would be no losses, then this money will be refunded to those who put it up as a guarantee, while, if the losses are greater than the amounts above stated, the street-railway company will stand such losses. This agreement was approved by the improvement association and a considerable portion of the money was raised at the first meeting where this plan was submitted, and it is hoped that the entire funds necessary for the guarantee will be raised soon. This arrangement commends itself to the commission as being eminently fair, and may be used in other cases where there is a demand for transportation service. In point of fact, there are at this time at least twelve other localities in Baltimore where transportation is desired.

It is my belief that in every community the public will be best served by a coördinated service and a unified system in which the electric trolley line, the "trackless trolley" and the 'bus will each serve a useful place in the field of transportation. It is believed that it is a great mistake for the street-railway companies to refuse to give service and to permit a part of the transportation facilities to be furnished by outside interests which at all times are potential competitors even though they start in such a way that there is no competition. We also feel that the established transportation system is in a position to give better service than any possible independent operator, and it is our belief that not only will the urban transportation systems in the future be compelled to utilize trackless methods of transportation to supplement the existing electric railway lines, but we also believe that throughout the rural districts the railroad companies will find that their interests can best be served by establishing feeder lines of 'buses rather than to allow 'bus transportation to fall into the hands of those who will establish competing lines.

Truck Making in Scandinavia

Although fundamentally sound, the Scandinavian countries have been so much affected by the general chaotic state of European finances that the buying capacity of the public has greatly decreased during the last two or three years, with a resulting reorganization in the entire automotive industry on a greatly reduced basis. This very unstable condition makes it impossible to state the exact output of various Scandinavian motor factories at the present time, and such figures as are given below are based on the capacity of the plants mentioned when operating under normal conditions.

The largest and by far the most important motor-car manufacturing plant in Scandinavia was the Scania Vabis, with headquarters at Stockholm and factories at Södertelje and Malmoö, Sweden, at Copenhagen, Denmark, and at Moss, Norway. The Swedish factories, with a capital of 14,000,000 crowns, employed about 700 workmen; the Danish factory, capitalized for 1,500,000 crowns, employed about 120 workmen; the Norwegian branch, entirely independent financially, was about half the size of the Danish factory. These plants produced altogether about 800 cars annually, most of which were trucks. Three models of passenger-cars were built—30-horsepower, 50-horsepower, and 70-horsepower—and six models of trucks ranging in size from 1½ to 6 tons.

About a year ago the Scania Vabis got into financial difficulties which caused liquidation. A reorganization is now being effected in Sweden under the name of Aktiebolaget "Värdsholmen"; the Danish factory continues under the old name and has kept up the manufacture of gears, for which the old company had made a name for itself. Accordingly, it may be said that Scania Vabis is today out of business as an automobile-manufacturing concern; but it is possible that the high quality and former success of its vehicles may bring about a further reorganization of the company for the renewed manufacture of machines when times are more normal.

De Forenede Automobilfabrikker (United Automobile Factories), with headquarters at Odense, Denmark, and a branch factory at Copenhagen, was started about five years ago by uniting three existing Danish factories—the Thomas B. Thrige at Odense and the Anglo-Dane and the Jan in Copenhagen. This concern has a capital of 2,000,000 crowns, employs about 200 workmen, and produces 200 machines annually under the trade name "Triangle." Its output is almost entirely trucks, which are very substantial and economical in up-keep. Motor locomotives are also manufactured by this concern. The financial rating of the company is very good in spite of the general

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bad condition of the local motor vehicle market.

In addition, Kramper and Jörgensen (the "Gideon" motor cars), of Horsens, Denmark, and A/B Tidarholm Fabrikker of Sweden have until recently been manufacturing automobiles in Scandinavia. Both these firms, however, are now out of the motor-car manufacturing business, and there is no present evidence that they will enter this field again.

Shipments of motor vehicles from the United States to Scandinavian countries during the calendar year 1921 are shown in the following table, the data being taken from United States export statistics:

	Motor trucks.		Passenger cars.	
Country.	No.	Value.	No.	Value.
Denmark ...	18	$33,375	109	$ 159,586
Norway	20	28,461	55	67,500
Sweden	64	133,690	920	1,039,275
Total Scandinavia ...	102	$195,526	1,084	$1,266,361

In spite of the present abnormal situation, Scandinavia must be regarded as a good field for motor vehicle sales. However, the market for American automobiles is handicapped by the ease with which users of European machines may obtain spare parts. This difficulty might be overcome if the American manufacturers were to place a complete line of spare parts at a central distribution point in Scandinavia. Copenhagen would be the natural location for such a main service station, as it is the principal commercial center of both Scandinavian and Baltic countries. The elimination of these replacement difficulties from which dealers suffer, due to the distance from American factories, is of the utmost importance to continued success of American machines in Scandinavia.

Electric Truck Show

With a luncheon, two conferences and a two weeks' exhibit, electric vehicle dealers in the New York metropolitan territory are planning to make April one of the most auspicious months in the history of the industry. The show is scheduled for April 3 to 15 and more than 30 manufacturers have signified their intention of taking part. It will be held in the showroom of the New York Edison Company at Irving Place and Fifteenth Street and there will be no charge for admission.

During the first week street trucks ranging from 750 pounds' capacity up to 5 tons will be shown. Passenger-cars will also be displayed during this week. On April 9 these will give way to industrial trucks and the second week will be devoted to the demonstration of methods of handling materials at freight-stations and in industrial plants. The accessory exhibit, which will include storage-batteries, charging apparatus and electric control equipment, will extend over both weeks.

The first electric vehicle conference will be held during the street truck show and problems concerning the operation of street trucks will be discussed. The second conference, held during industrial truck week, will take up problems growing out of waterfront congestion and inefficient methods of handling materials in factories.

Despite High Haulage Costs Owners Are Satisfied

By J. C. SOMERVILLE

Manager, Fairmount Creamery Company, Pittsburgh

OUT of our fleet of eight motor trucks, we depend on our two 3½-tonners to do the long-haul work. These two machines, purchased August 6, and November 17, 1919, are used for delivering butter, eggs, cheese, poultry and canned goods to retailers in the suburbs and nearby towns. We supply dealers in New Kensington, Freeport, McKeesport, Beaver Falls and many other cities near Pittsburg.

Both vehicles do exactly the same work. Early every week-day morning they start out with a full load of produce, and run for 10, 12 or 14 hours, as the route requires. Their loads vary considerably according to the orders we have on hand, but they average about 8,000 pounds per truck. Occasionally, to clean up the orders on hand, they have to carry a little more, though we know this is bad practice. Truck No. 9 averages 33.16 miles a day; No. 12, 48.34 miles a day.

Our costs show that truck No. 9 costs us $31.25 a day, 94.25 cents a mile, $7.81 per ton, and 47.13 cents per ton-mile. Truck No. 12 costs us $35.88 a day, 74.21 cents per mile, $8.97 per ton, and 37.11 cents per ton-mile. These costs are not high when the operating conditions are carefully considered.

To date our repairs have averaged about $150.00 per month for each truck. We figure they will not average this much again because through a driver's carelessness we had the misfortune to burn out one of the motors. This cost us $675.00 and raised the cost of repairs considerably above the normal.

To our estimate of $150.00 a month per truck, we must add $65.00 a week for a mechanic who attends to our eight trucks, making a total of $2,222.50 estimated repairs per year for each machine. While these repairs are certainly high, it should be remembered that we are running the truck under very adverse conditions.

Our gasolene cost is also high, because there are many stops and starts, and a great deal of idling of the engine while deliveries are being made. In addition the trucks encounter many steep hills, very bad roads, and lots of mud.

Our driver cost is high because we have to furnish each truck with a helper at $24.00 a week, in addition to a driver at $34.00 a week. At these prices we are not required to pay extra for overtime necessary on some of our runs.

All these conditions tend to make the cost of operation per day rather high; but the machines do so much work that the costs per ton-mile are rather low—only 47.13 cents for truck No. 9, and 37.11 cents for truck No. 12. Since a truck-load of produce is worth between $4,000 and $5,000 we can easily afford to pay $33.00, or less than 1 per cent. of its value, for delivering it. Similarly, when it is considered that these two trucks have carried $2,389,500 worth of produce during the short time we have been using them, their total operating charges of $17,655.07 looks very small.

We have never used horses on this work, because it was impossible without motor trucks. No team could cover the necessary mileage, so this whole branch of our business is built upon the motor truck. In spite of our high delivery cost, this business is bringing a good profit.

OPERATION.	
Days operated	229
Miles traveled	11,070
Miles per day	48.34
Miles per gallon of gasolene	2.4
Miles per gallon of oil	43
AVERAGE COST.	
Cost per day (including driver and helper)	$ 35.88
Cost per mile	.7421
Total cost for period	8,215.77
ITEMIZED COST.	
Driver cost per day	$ 9.67
Depreciation, per mile	.0953
Maintenance and repairs:	
Actual, total	1,600.00
Actual, per mile	.1445
Estimated, per mile	.1785
Tire cost, estimated, per mile	.0620

N. A. C. C. Suggests "Safety Tag"

Motor vehicle manufacturers of the National Automobile Chamber of Commerce have recommended that with each new machine put on the market a "safety tag" be provided setting forth some fundamental traffic precautions to encourage safe driving. A sample form of recommended suggestions follows:

THESE CAUTIONS MAY SAVE A LIFE.

1. Always remember you are an engineer, fully responsible.
2. Inspect your brakes at least once a month.
3. Never pass to the left of a street-car.
4. Never pass a street-car when it is stopping for passengers.
5. Always signal with the hand when slowing down, turning, or stopping.
6. Sound horn three times when backing.
7. Observe the traffic rules carefully; they are made for your safety.

Big Bond Issue for Kentucky

The $50,000,000 state road bill has been passed by the Kentucky house by a vote of 63 to 34. It now goes to the senate. The measure provides for submission to the voters at the November election a proposition to issue $50,000,000 worth of bonds to be used within the next five years for building 4,000 miles of state highway system. It pledges the gasolene tax, the automobile license tax and the 3-cent road tax to pay the issue off in thirty years. A provision allowing a 5-cent property tax is included, its proponents say, to make the bonds salable.

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Lumber Truck and Trailers Cheaper Than Horses

By C. R. KANT

Manager, D. J. Rohrer Lumber Company, Clintonville, Wisconsin

WHEN we first began to haul with trucks we used a light truck only. All our heavier work was done with teams, as we believed the motor truck incapable of handling our heavier hauling in as efficient and economical a manner, but we gradually became convinced that not only our light hauling, but most of our heavy hauling too, could be done with motor trucks, and where time was an important factor, teams could not compare with trucks.

Early last summer we purchased a used 3-ton FWD truck and a 5-ton trailer and since have been using it for all kinds of hauling. In all our work we have found it to be an invaluable aid.

Operating cost records are something comparatively new with us. It was not until some time after the purchase of our heavy truck that we began to keep a definite record of our hauling costs, but we can now safely say that our transportation, including fuel, oil, drivers' wages, depreciation, repairs, insurance, interest on the initial investment and all miscellaneous expense, is costing us far less per ton-mile than was the case when we used teams. In addition to this lower cost we are also able to get better and faster service than ever before.

In the early part of December, 1921 we sold some red oak veneer logs to the American Plywood Company of New London, Wisconsin, for immediate delivery, and they had to be hauled a distance of from 23 to 30 miles. It was a little late in the season and we were expecting heavy snows to come most any time to hinder our hauling, so we went at the job with truck and trailers and made as quick work of it as possible. The weather during the twelve days required to complete this job was not altogether favorable; intermittent rains and snows kept the roads in bad shape for several days. Much to our satisfaction, on these days we continued to carry the usual loads without difficulty and in some cases carried overloads. For the good work that our truck did on these days we believe that it deserves special mention, for it responded to every emergency and took the long slippery grades without bucking once. In this we were very fortunate, as we finished our hauling none too soon to avoid heavy snows and severe winter weather.

During the time which it took to complete this hauling job we kept a record of the costs, as shown in the accompanying table. One side of our cost sheet is used for cost data and one for operating data. These data show in several cases where the truck and trailer were both heavily overloaded and, while we feel that the harm done by overloading is greater than the profits returned from it, we were almost obliged to overload our equipment in this case so as to finish the job before winter weather made our hauling difficult. As a result of our being able to complete this haul in such a short time, we received a premium of $10.00 per 1,000 feet. This amounted to a total of $160.00, which was additional profit, and could not have been earned with teams.

By operating trucks instead of teams this company now enjoys many of the motor truck's time- and money-saving advantages, for which the premium collected on the logs hauled to New London is an example. It is possible for us now to purchase and haul lumber for our retail yard direct from wholesalers anywhere within a radius of 50 miles. This has many good features: it saves us the delays common to freight shipments, we can haul less expensively, and we can purchase in truck-and-trailer-load lots instead of car-load lots and cut down our investments when we need only small quantities of certain materials. We can make deliveries direct from the wholesaler to the customer and eliminate the necessity of unloading large shipments in our sheds only to reload for delivery to the job.

That the motor truck is doing a great deal toward making the lumberman's job an easy one is true, beyond a doubt. True, there are some jobs which the motor truck can not do, but its use in the lumber industry has grown to such an extent in the last few years that its value can not be denied. Modern industry demands the best means of transportation and the lumberman is forced to acknowledge the motor truck as the best means where conditions are at all favorable.

ANALYSIS OF THE PERFORMANCE AND OPERATING COST OF A 3-TON MOTOR TRUCK IN THE SERVICE OF THE D. J. ROHRER LUMBER COMPANY, CLINTONVILLE, WISCONSIN, FOR THE TWELVE DAYS ENDED DECEMBER 19, 1921.

Performance.

Days in operation during period	12
Round trips made during period	16
Tons carried on truck during period	53.125
Tons carried on trailer during period	59.990*
Total tonnage carried during period	113.115**
Miles traveled with load during period	368
Miles traveled without load during period	332
Total miles traveled during period	700
Gallons of fuel used during period	325
Gallons of oil used during period	9.375
Average number of round trips made daily	1⅓
Average number of tons carried daily	9.426
Average number of miles traveled daily	58⅓
Average number of miles traveled per gallon of fuel	2.153
Average number of miles traveled per gallon of oil	74.667

Cost.

	For the Period.	Per Mile.
Fixed expense (except driver), taken as $1.00 a day	$ 12.00	1.71c
Driver's wages	39.56	5.65
Helper's wages (part time)	1.50	.21
Miscellaneous expense	30.61	4.37
Fuel, 325 gallons	74.96	10.71
Oil, 75 pints	9.39	1.34
Total cost	$168.02	43.99c
Cost per day, 58⅓ miles @ 43.99c	$25.66	
Cost per ton	1.48	

*On two days the truck was operated alone, on one day it drew two trailers, and on nine days it drew one trailer.

**On two days it carried return loads, once of 3,950 pounds and at another time of 5,000 pounds.

Timken in Good Position

The Timken-Detroit Axle Company for the fiscal year ended December 31, 1921, shows a "moderate operating loss." Surplus stands at $8,736,737 compared with $9,866,662 at the close of the preceding year.

After reducing inventories to cost or market, current assets December 31, 1921, totaled $8,350,104 against current liabilities of $2,427,301, leaving net working capital of $5,922,803. This compares with $8,762,148 at the close of 1920, and $11,864,133 at the end of 1919.

The balance sheet follows:

Assets: Cash, $502,986; notes and accounts receivable, $503,064; inventory, $7,258,281; marketable securities, $85,772; other assets, $480,276; land, buildings and equipment, $10,056,237; good-will, $1; deferred assets, $218,519; total, $19,105,138.

Liabilities: Bank loans, $1,950,000; accounts payable, $438,824; accrued expenses and dividends $38,477; preferred stock outstanding $4,962,700; common stock outstanding $2,978,400; surplus $8,736,737; total $19,105,138.

President A. R. Demory says: "Through the process of liquidation we feel we have readjusted ourselves to a position where this year should show a profit. Specifications for immediate delivery of axles have increased very materially. We have acquired new customers, retained all our old ones and feel confident that we are in shape to work out of this very trying situation and maintain the very strong standing we have always enjoyed. We should end the year 1922 with a very satisfactory showing. Our plant assets valued conservatively at $10,056,000 are not covered by mortgages or liens of any kind."

Every day in the school year 14,000 children motor to school in North Carolina. Consolidation of the one-room rural school houses into high-grade central schools is going forward rapidly in this state. Ninety-three per cent. of children carried to school at state expense are transported in motor vehicles.

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Building and Servicing Truck Bodies

By C. M. MANLY and C. B. VEAL

SERVICE, in its broadest sense, must cover every phase of the marketing and operation of motors and trucks. Whatever success is attained in the industry must be based fundamentally on service. Service to the dealer, good or bad, begins directly when the chassis is assembled, and continues through him or directly to the consumer throughout the usable life of the vehicle. The best interests of the dealer demand a service that results in the largest volume of sales, quickly made, with the minimum capital investment, and at the same time insures that greatest of all selling assets, satisfied customers.

The truck chassis builder turns out, for the most part, a product that can be rendered useful only by the application of a body. Therefore, he should be vitally interested in having the user of his vehicle obtain a body of good quality, properly mounted and adapted to the chassis and the work to be done. He is likewise concerned with everything that helps his dealers. The consumer, in this case the truck owner and operator, deserves to receive promptly with a newly purchased chassis a body suited to his needs with the assurance that it is durable and can be repaired with a minimum of delay and lost time for the vehicle.

The whole fabric of body service must be woven around the idea that a commercial motor vehicle has rendered its maximum of profit and usefulness only when the paying operation begins as soon as possible after it is assembled and continues steadily at a maximum per diem for the longest time with minimum losses through lay-ups for repairs and renewals. Any attempt to analyze the question of body service, therefore, must bring into consideration all phases of body design, production and distribution, as related to the chassis manufacturer, the dealer and the owner, as well as the body manufacturer, or builder.

Four distinct general plans have been followed by chassis builders in securing body equipment:

(1) Building in their own shop,

(2) Building on contract by the body-maker to plans and specifications of the chassis builder,

(3) Building by the local body maker to the order of the dealer or owner.

(4) Assembling from stock standard sectional units recommended by the dealer or selected by the owner.

The chassis producer who attempts to enter the body-building business for the purpose of supplying his chassis with bodies will find it necessary to make large investments in plant and equipment, as well as to provide an entirely separate organization for their design and manufacture, since body-building is essentially a wood-working industry, as contrasted with the metal-working operations of chassis construction, unless the questionable procedure, treated more specifically later, of building all-metal bodies is contemplated. Even then the type of metal work involved is entirely different from that of chassis construction, and requires radically dissimilar shop and tool equipment and personnel. Many of the large sheet-metal workers have been kept out of the body business because sufficient quantities of bodies of uniform type and dimensions can not be sold to make the tooling and other quantity production worth while. The fact that some of these companies turned out truck bodies efficiently and at a low price for the government in war time but have since found it unprofitable to produce for the trade under present conditions of standardization, or, rather, lack of standardization, should make clear to the chassis builder the inadvisability of going into the construction of metal bodies where the outlet for these bodies must necessarily be limited by the sales of their own chassis.

If the chassis builder plans anything like national distribution of his product, he must offer a line of bodies sufficient to meet the widely varying demand in different sections of the country. To satisfy the requirements of northern winters the driver must be protected from the cold with a complete inclosed job, while in California and the Southwest, in fact all through the South, there is no market for such body types. In addition to these climatic considerations, every section of the country insists upon certain features peculiar to itself, either because of more or less clearly defined limitations of the prevailing business in which the body is employed, or through unnecessary but obstinate adherence to established local custom.

Even if local distribution only is attempted, a considerable variety in types must be offered, for not only must "the butcher, the baker and the candlestick maker" be provided for, but the grocer, the department store, the manufacturer, the farmer, and, in fact, every conceivable business and trade, comes in for special attention in developing any adequate line of bodies.

A large proportion of the city demand will be for panel bodies, if for no better reason, because the large, plain panels of the sides have a real value for advertising purposes. In sparsely settled districts advertising space is of less value and consequently the small town and country merchant and tradesman will purchase only an express-type body, with or without top. The farmer generally has little use for the body type that is most popular in the cities, and demands an entirely different design, depending in detail upon the particular branch of agriculture in which he is engaged. In the wheat belt his body must be grain-tight and preferably fitted with a special grain end-gate and other features peculiarly suited to his needs. If he is raising cattle or hogs, he will probably want a stock body, and if this body can be equipped with a stock-loading chute, its sale will be made easier. While the general all-around farmer will prefer some form of universal, convertible platform-type of body, the dairy farmer will demand something different, the orchardist something else, and so on; each prospective purchaser will insist upon some type as being suited to his need. No scheme of body service will be satisfactory to these various consumers, or promote the best interests of the industry, that does not take seriously into account all the conditions leading up to their individual demands.

There are many groups of merchants that require more highly specialized bodies, such as ice-cream manufacturers, furniture dealers, florists and undertakers. Then there is a large class of users of dump-bodies or other bodies with special loading or unloading devices, including contractors and dealers in coal, lumber, sand, gravel, brick, cement and other builders' supplies.

The larger department stores are representative of an extensive class of buyers who have created an unmistakable advertising value through years of use of bodies of distinctive, uniform design, painting and attractive appearance. For purely economic reasons, such users can ill afford to purchase bodies of varying type, even though the saving in first cost may be considerable.

Frequently peculiarities, not always evident to the outsider, in the transportation problems of a particular company fully justify the employment of highly specialized bodies, through savings actually effected thereby. In contrast with these cases, it is true that there is a large class of users, who, so far as efficient handling of their goods is concerned, could use a common type of body but, to gratify their personal preferences or pride or idiosyncrasies, insist upon exceptional construction and are willing to pay a higher price to obtain a body changed or built to suit them.

IN THE final analysis the chassis builder can find no better reason for entering the body-building field than that of increasing the sale of his chassis. A serious consideration of the widely varied types of body required to meet the demands of his market cannot but convince him that the investment and expense involved will be out of all proportion to the increased profit on his product if he attempts to cater to all prospective customers. On the other hand, limitation of the body types offered with his chassis to a very few standardized jobs, combined with insistence on selling the chassis and mounted body as a unit, is certain to result not only in small body sales but in reduced sales of chassis, since a large proportion of buyers will not take kindly to having a so-called standardized body forced upon them regardless of its suit-

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ability for their service. Under such circumstances the loss will be greater than any possible gain, since the customer will buy the chassis that gives him a free hand in obtaining the body best suited to his needs.

Commercial motor vehicle bodies are too bulky to be shipped long distances economically by rail and, excepting the limited number of vehicles that can be driven away from the factory, the mounting of bodies at the builder's plant need not be considered as having any great possibilities.

ONE of the great obstacles in the way of chassis and body standardization has been the bulkiness of bodies in railroad freight transportation, the possibility of damage in shipment and the expense of crating. The prohibitive expense of shipping complete bodies "set-up" can be somewhat reduced by shipping them to dealers "knocked-down", thus increasing the number of bodies which may be placed in a 40-foot freight-car from 6 to 16, and throwing the burden of assembly and mounting on the dealer.

In any case the dealer's capital requirements will be increased by having bodies added to the inventory that he must carry. If the line of bodies he has to offer is sufficient to meet the demand, the expense of storage space becomes no small item, while a limited line can not meet competition, and results in loss of sales through inability to assure proper body service to prospective chassis purchasers. It is generally accepted that the dealer in trucks can succeed only by selling transportation rather than simply vehicles, and he can not claim to sell transportation unless he is prepared to recommend the body types best adapted to the purchaser's needs. The whole process becomes still more expensive for the dealer, if he must furnish the facilities and labor for assembling and mounting bodies.

If the chassis builder takes a compromise course and offers a medium number of well-selected types, of which the dealer carries a small stock continually, the most promising purchaser is likely to be disgruntled because the body service offered with the chassis is not all that he expects, or can obtain elsewhere, so far as variety is concerned. Even if he does not go elsewhere to buy at first, the dealer is certain to find it burdensome to carry parts and be prepared to make repairs on the limited number of each type going out on sales of complete units. As anything less than a maximum of service in repairing and remodeling bodies will prove unsatisfactory eventually to the user, the effort expended in trying to build up a permanent business of selling the chassis and the body as a unit is, with few exceptions, certain to be entirely out of proportion to the results attained.

The second plan, while it necessitates the chassis-builder carrying a body-designing and engineering department, relieves him of the greater investment in shop and tool equipment and body fabricating organization. Th body-builder, through his ability to furnish other designs of his own for the trade and to take on contracts to supply various chassis producers, is in a much better position than the latter to acquire an adequate volume of body business for efficient and economical production. Here the advantage to all concerned, as compared with the first plan, ceases, however, since the distribution troubles remain the same, with the possible addition of an initial freight shipment of bodies from the body-builder to the chassis plant, and the complications arising in repair service with the attendant embarrassment to the user through the interdependence of the chassis producer and the body-builder in all matters of responsibility affecting the guarantee, proper functioning and durability of the body. Of the four methods applicable to the supply of bodies for trucks having national distribution under existing conditions, undoubtedly this plan has the least to recommend it.

The third plan, historically, has been the accepted method of most motor vehicle builders upon first entering the truck field, and is still the plan generally followed by the majority of truck companies. This practice came into effect not through the application of any special economic theory but rather through the natural working-out of conditions as they were and still are to a lamentable degree, especially in connection with heavy-duty trucks.

Comparatively few automobiles were used for commercial purposes until within the last ten years, and even as late as 1913 the bodies necessary for these few commercial chassis were built principally by small wagon-shops for the owner or furnished to him by the chassis builder. Where the body problem is put up to the dealer and he endeavors to answer it through the medium of the custom builder, he may expect bodies only slightly developed from those for horse-drawn wagons, in the production of which custom builders have, for the most part, obtained their experience. The result is a body of much greater weight than is necessary from an engineering standpoint, and built, rather than designed, without regard for the principles involved. Progress in the art of custom body-building for commercial transportation has been almost negligible, all alike having followed horse tradition. Nor is progress to be expected from the local body-builder, hampered as he is by tradition and lack of technical training; he can not advance even if he desires to advance.

With the exception of dealers in vehicles of exceptionally high quality, the dealer is forced by competition to obtain a fairly good body at a medium price. The methods and equipment of the local builder are usually very crude. He generally has little or no modern wood-working machinery and must depend upon tedius hand-work for all or most of the fitted parts. Through hurry, carelessness, or improper supervision, poor workmanship results. Such bodies, loosely fitted together, soon become wobbly, decay sets in prematurely from moisture getting into the joints, and the life of the body is wofully reduced.

The dealer who expects to get from the local builder just what he specifies at a low or even a medium price is certain to experience disappointment. But not all custom bodies are poorly built; many of them show exceptional workmanship and materials. The difficulty with such bodies is that the price is disproportionately high, and even the best of them, constructed with the most conscientious care, are usually deficient in some particular. The making of the body is based on the more or less restricted experience of the builder who, as a practical man, following custom, has exaggerated the care and expense above the true requirements in certain details. Under the critical inspection of a competent engineer, wasted effort will be evident in the construction of virtually all good custom-bodies. In his anxiety to turn out a durable product and always "throw any errors on the safe side," the small, scrupulous builder is inclined to use timber a little larger than necessary here and there and place heavy and elaborate iron forgings where they can do no good. All of this adds to the price and, as increased non-pay load, permanently reduces the efficiency of the vehicle by just that much as a transportation unit.

The dealer is quick to realize the loss he sustains through delayed deliveries of the chassis while he waits for a body to be built. Both dealer and customer are aggravated and suffer a substantial loss during this period of waiting, which may run into weeks after the truck is sold. The tying-up of the dealer's money in chassis inventories presents a retardation in the process of merchandising that cannot be ignored by the chassis builder. He should be just as much interested as the dealer in having his chassis promptly placed in active service, for idle equipment represents an investment earning no interest, a definite economic waste that, like time itself, cannot be recovered.

THIS plan of body handling leaves the dealer almost powerless in rendering service to the buyer in matters of repair, all of which are likely to prove relatively expensive in both time and direct cost; a condition that is rendered more exasperating by enforced total loss in earning capacity of the vehicle while it is laid up for repairs, which commonly takes considerably more time than the proportionate value of the parts affected, because the custom body-builder habitually gives little or no attention to the incorporation in his product of features that will facilitate rapid and economical repair.

The successful operation of the fourth plan has been made possible only comparatively recently owing to a lack of sufficient demand and the continuous evolutionary changes in body requirements as the business developed. Through the adoption of this plan the chassis builder and his dealer derive a great many benefits. Not the least of these for the former is complete relief from the undertaking of body-building. While eliminating the capital investment involved in the first plan, he simultaneously removes from his dealers the burden of body inventories common to the first and second plans. Moreover, he is assured that his chassis will not be abused by being made to carry a poorly proportioned or ill-fitting body of excessive weight or capacity. The dealer is further helped by overcoming the slowing-up of merchandising while waiting for each body

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to be built individually under the third plan.

To assist in getting a clear understanding of the development and possibilities of this whole scheme, a distinction will be made between the different sizes of chassis used for commercial purposes, dividing them into the following classes:

(1) Delivery chassis, requiring a commercial body, comprising all light popular chassis, whether designed primarily for passenger or commercial purposes, with a rating of less than 1 ton.

(2) Truck chassis, rated at 1 to 1½ ton, requiring a truck body.

(3) Truck chassis, rated at 2 to 2½ ton, requiring a truck body.

(4) Truck chassis, rated at 3 to 5 ton, requiring a truck body.

The plan involves the production of a complete standard line including a number of styles of body for each chassis.

The large volume of trade available in a single design of chassis early in the motor-wagon business made possible the successful beginning of standardization in stock bodies for the first class of vehicle and, as bodies for both the first and the second classes have now been standardized thoroughly, they can be treated, not as a theory, but as a matter of practical accomplishment, and the results regarded as an indication of what can be accomplished by the standardization of heavy-duty trucks.

The prospect of a large market for these lighter bodies has permitted the treatment of body design, production and maintenance as engineering problems to an extent never before realized in the body field. The needs of every large class of users have been analyzed thoroughly and standard types developed, each with features that fit it to the actual requirements. There is occasionally some exceptional service that can not be satisfied by any possible standard, but the vast majority can find what they want in the standard types. The demand for infinite variety is founded on custom and prejudice rather than practical experience or analysis, and a trial usually convinces the buyer that the design of the standard body for his use is based on a more comprehensive and accurate study of his requirements than he could possibly make for himself.

BY building the bodies in sections and standardizing these sections, it has been found possible to use certain sections for very many different types of these bodies. In some respects, the scheme parallels, although in a very different field and with much greater economic possibilities, the flexibility and utility of the sectional bookcase. Standardization has been carried to such an extent that the reduction in the total number of component parts has diminished noticeably the body-builder's investment in raw materials, work in process and finished goods.

Many major parts of bodies and cabs are interchangeable on various types of body. Starting with one platform or base, a choice can be made from several side-panels, rear sections and tops, thus making it possible to assemble any one of, literally, a dozen body styles on this one design of base. Likewise, doors and windshields used on cabs or vestibules can be assembled interchangeably with a variety of other body units. In fact, windshield, vestibule doors, vestibule side-windows, rear doors, toe-boards, cushion and lazy-back are worked out readily, each in a single-unit design common to all bodies of whatever model where any one of these items is required. A single endgate can be used to equip many different models.

Standardization on a few stock sizes of lumber has made possible its purchase under carefully prepared specifications that insure a quality best suited to the purpose at reduced prices. In the case of the heavier frame and platform members it permits the direct shipment of properly conditioned and seasoned fully machined parts from the lumber-mill to the body assembly plants. This reduces the weight to a minimum before shipment, since it is fully dried instead of green and all waste in the machine-finishing of the parts occurs at the lumber mill before shipment. The total cost of freightage is still further reduced by replacing the double haul from the lumber-mill to the fabricating plant for machining and then on to the assembling plant by a single shipment from the mill direct to the assembling plant. By adopting efficient quantity-production methods in the manufacture and subassembly of parts, substituting machine for hand labor and manufacturing and fabricating the parts and units under steel jigs, the quality has become more uniform and better at a reduced cost, which has been lowered still further by simplifying operations, decreasing the number of operations and making possible the employment of a less skilled class of workmen.

In no phase of the body-builder's activities is the gain of the standardized sectional body over the earlier forms of construction more evident than in freight shipment. Whereas only six bodies, completely set-up, can be shipped in a 40-foot freight-car, this number can be increased to a maximum of 16 by having them "knocked down." After the bodies are completely built and set-up by body-makers and have been put through the painting and trimming departments they are sent to the shipping department where the tops and sides are disconnected and then crated for loading in the car. Sectional units for 40 bodies can be packed in the same car, with a much lower rate classification, effecting a striking saving in freight-cost and in the labor of assembling, disassembling and crating.

To pass a maximum of these economies on to the dealer and insure continuous service to the user, the advantages of this plan are still further extended by establishing factory assembling-branches in all large distributing centers, carrying complete stocks of bodies and parts and well equipped for mounting, painting, lettering and repairing. The body sections, as received from the fabricating plants by those branches, occupy a minimum of storage space and need be assembled only to care for sales demands. At first many were skeptical concerning the possibility of turning out body sections with sufficient accuracy to make all parts interchangeable and permit assembly in the fabricating plant, at assembling branches or by dealers themselves. Of course, it had been fully established that this could be done in the case of machines composed of all-metal parts, but it had to be demonstrated that this is not rendered impracticable in a combination of wood and steel by the expansion and contraction of wood caused by variations in moisture and temperature. While it is true that extraordinary care must be taken in the selection and conditioning of the lumber and finished wood-parts, all this attention, in quantity operations, results in little additional expense, and this is more than offset by improved quality in the product as compared with bodies built under less exacting conditions.

The accumulated savings due to increased purchasing power, elimination of waste, economical production and distribution methods, and reduced labor, freight and storage charges, when passed on to the dealer, enable him to offer his customers the combined unit of chassis and body at a lower price than it can be secured by any other practical solution of the body problem. These combined benefits can be attained only by quantity output, assured through national distribution of a very complete line and accompanied by the ability to equip not only the chassis of one but those of several of the largest builders.

The lower price at which standardized production bodies can be sold benefits the dealer directly through increased sales. The dealer's volume of sales is further extended by the development of large new fields for the sale of chassis, made possible by the creation of standardized body types especially suited to these fields. In fact, the body-builder has been, and still is, doing as much as, if not more than, the chassis builder in developing new fields for the use of trucks. The opening of new provinces of employment for the motor car by the creation of special bodies is well illustrated by the variously called park, country-club or suburban bodies. Thousands of light chassis with these bodies are now sold every year, and their sale is increasing very rapidly. Well-to-do people, with country estates or suburban homes, frequently use a light, popular-priced chassis with this body as a general utility car for taking passengers, baggage or freight to and from the railroad station, marketing, going to the golf club, or general knock-about purposes.

NOT the least of the advantages of the dealer is that of immediate delivery. In common with most purchasers, the truck "prospect" generally postpones the buying of a new vehicle as long as possible but, when finally he is persuaded to close a deal, he wants the car immediately. It may be that his old chassis has broken down suddenly, or that additional transportation must be provided for at once. In any case the buyer does not want to wait. Consequently, the dealer who can make immediate delivery of the chassis complete with body, ready for service, has a very tangible advantage, for the chassis without the body is of no use to the purchaser. To reap the full benefit of prompt delivery, the dealer must be able to offer a sufficiently wide line of types to meet all the

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usual demands. With the assistance of the body-builder's engineers the dealer is able to give the customer expert advice regarding the type of body best suited to his business. Furthermore, the body builder, through his branch assembly-plants, is prepared to give the buyer not only what he needs but what he may reasonably want in the way of special painting, lettering, accessories, numerous variations or additions, in rear and front inclosures, shelves, partitions, doors, etc., so long as the standard basic sections are employed without variation in the design and dimensions.

If the volume of his business is sufficient, the dealer can carry profitably on the floor of his own showroom various bodies, the "best-sellers," mounted on his chassis for demonstration purposes. But whether or not the chassis dealer exhibits sample bodies, the body-builder's branch should maintain salesrooms and displays where the dealer can show his customer exactly the type of body he is to get. Incidentally, the branch organization becomes a very potent factor in assisting and making sales for the chassis dealer, who finds that often particularly difficult customers can be brought to the closing-point by taking them to the body-builder's branch and showing them well-made and well-finished bodies and giving them the advantage of the body engineers' advice as to style and type. Thus, these branches not only carry the necessary complete line of bodies and parts to meet the needs of dealers and customers, but they render many helpful services to both in turning out the fully equipped unit.

Not only does the dealer benefit by increased chassis sales, but by handling the body sale he realizes an additional profit on the body itself in discounts in which he is protected by the reliable manufacturer. This profit, while attractive to the dealer, does not detract seriously from the economies effected by quantity production.

With this scheme of body supply the dealer not only avoids tying up his capital in carrying a stock of bodies but, by quicker sales and more especially by immediate delivery and collecting, he is able to reduce the time his money is lying idle in the chassis by from three to six weeks, or even more in many cases.

That which helps the dealer benefits the chassis builder indirectly, and, to a great extent, the advantages that they enjoy are passed on to the owner and operator. Better bodies at more attractive prices and immediate delivery are the first of these benefits to appeal to the user. When he finds that without losing any of these he can obtain, generally, exactly what he wants and, if not, a body designed to satisfy his actual needs, he is not likely to look farther in making his initial purchase of body equipment. It is after purchase, however, that he experiences the greatest advantage of this method; namely, prompt, effective and economical service and repair. If he has been a user of custom-built bodies, individually fitted together by hand by body-builders, he has learned that they are usually framed so that in case of damage it is almost as expensive to repair a body as to purchase a new one. Also, he has found that the small body-builder, after supplying the original body, makes no pretense of giving service on the body. Under these conditions the user not only has to pay the local small shop an excessive price for repairs but he must bear an even greater expense in that his whole investment in the chassis and the body is tied up and his business suffers heavily while his equipment is out of commission.

A STANDARIZED sectional body can be smashed by collision or other accident and regardless of the extent of damage, within a very few hours any damaged piece, or entire sections, can be replaced, if necessary. The manufacture of interchangeable body-parts, reduced to the minimum in variety, coupled with attention in design to facilitating replacement, offers about all that can be expected reasonably in the possibilities of quick, economical repair.

The extent to which these possibilities have been realized in actual practice is well illustrated by three typical cases. One of the large accident-insurance companies, in the settlement of a claim for damages to a 1-ton truck partially wrecked by a street-car in St. Louis, undertook recently to repair a standardized sectional body. Three quotations were obtained, two from local body-builders and one from the body-builder's local branch. The builders each required 2 weeks to put the body into shape, and the quotations were $168 and $192, respectively, while the body-builder's branch quoted $52, naturally got the job and actually completed the repair, putting in a new side and a new panel, in 2 hours' time. A Boston truck-gardener skidded across the Charles Street Bridge, smashing a side-panel and part of the top of the truck body. Having but the one truck, he needed it every day and could not afford to lay it up for repair. Fortunately for him, it was a standardized sectional body, and the builder's branch replaced the side panel and top and had the truck back on the street in 18 minutes. A dairy company operating a fleet in New York City, building its own bodies and maintaining repair and paint shops, purchased three sectional bodies because it had to have equipment at once. On the first day of operation one job had an accident, smashing a side-panel and the top against a pillar on the Third Avenue elevated railroad. Finding that it would require 2 weeks to make the repair in its own shop, the company appealed to the body-builder's local branch, which turned the job out in the regular course of the day's work in less than 5 hours.

Similar examples of prompt and economical service could be added indefinitely, but these are typical and indicate what has been accomplished. The fact that all parts and body sections are built on thoroughly coördinated jigs, thus insuring easy assembling and the perfect fitting of all parts, makes possible such exceptional low cost and speed in handling repairs and replacement.

The largest builders of light chassis have modified their stripped chassis offered for commercial purposes to accommodate the mounting of existing models of sectional bodies; so that, while much might be done profitably in the standardization of chassis for motor wagons, the situation at present is such as to give the user some latitude in the choice of chassis and at the same time secure the benefits of the standardized body. To only a slightly less extent this condition also holds for 1-ton trucks. All this has been accomplished, not because of recognized standards, but in spite of the absence of such standards.

Trucks of greater capacity have not been produced in sufficient quantity in any one make or model to give the standardized heavy-duty truck body a fair chance. While the advance already attained in the light truck business serves to emphasize the pressing need for truck body standardization, this standardization can not be carried out successfully until the truck chassis has been standardized. It is doubtful whether any single step could be of more immediate advantage to the truck industry than standardizing chassis body-mounting dimensions, thus enabling body production to be put on a manufacturing basis. There is now a vast difference in all chassis dimensions that have to do with the fitting of the body, such as frame widths and lengths, rear-wheel dimensions, wheel-bases, driver's seat and its location and all controls. Standardizing frame widths and rear-wheel dimensions would help the body-builder most, but the length of the frame back of the driver's seat and the distance from the driver's seat to the rear axle should be given attention at the same time, establishing, say, a range of three lengths for each body-capacity. If, in addition to a uniform practice in these dimensions, agreement could be effected on a standard difference between the height of the frame from the ground and the diameter of the rear wheel for each capacity of truck, the heavy-duty body-builder would be able to count on a sufficient volume of demand to justify marketing standardized bodies for these trucks, and the track builder, the dealer and the user would enjoy all the advantages that now accrue only in the light truck field.

By such a process of standardization, not only the body-builders, but all suppliers of material to them could adopt standards that would reduce their costs greatly, and so through every process of the body industry effect remarkable savings. The delivery to the dealer of the mounted body could be made immediately from stocks of bodies, including a wide range of styles, carried by body-builders having branches or distributers throughout the country. There would be an enormous elimination of waste through the user getting his truck and body into profitable operation without any loss of time and continuing their use without expensive lay-ups for repairs; all on account of the superior service all along the line that can be made possible only by the standardization of such chassis dimensions as affect body mounting.

The International Harvester Company's Akron plant is rehiring several hundred of its former employes. Effective January 1 the company will go on a production basis of 5 speed trucks and 40 tractors a day, official report. Indications are that spring orders will necessitate a substantial increase in this schedule.

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A Street-Car Man's View of 'Buses

By C. D. EMMONS
President, United Railways & Electric Company, Baltimore

NOT long after the general movement of the consolidation of city service systems and their rearrangement to give the maximum service to the car-rider at the least cost, conditions were disturbed by the advent of the "jitney" craze in the year 1915. The experiences of Bridgeport, Toledo and Des Moines are recent enough to be fixed firmly in the minds of the entire country, yet there are still many sections that have not as yet taken any active steps to conserve for their citizens a coördination of its transportation facilities, such as will in the end make for the best transportation for the least money—a result, I am sure, all fair-minded citizens, as well as the operators of city service are anxious to attain. In many places, these "jitney" operators, and even operators of 'buses providing a higher type of transportation than that given by the so-called "jitney" itself, have been permitted to operate in such a piratical way that they actually steal from the established transportation company—whose aim is to give an all-round city service—enough to continue in existence and at the same time enough to cause a starved condition of the transportation system. It is a foregone conclusion that, were these irresponsible agencies compelled to assume the burdens and responsibilities of continuous service to all parts of the city at all hours of the day and night; during all kinds of weather; with the requirements as to taxes, street-paving, accident responsibilities, etc., such as are required of the transportation systems themselves, they could in nowise continue to exist. The recent examples in Bridgeport, Toledo and Des Moines have plainly shown that, by themselves, it is impossible for them to give a satisfactory city service and handle mass transportation adequately.

Having heard a great deal about the possibility of the motor 'bus finally supplanting the street-railway systems of our cities, and with the often-repeated statement that it is being done in London and other English cities, the writer, accompanied by the vice-president of his company, made a trip to the British Isles during last summer and, instead of finding this statement in any way proved, found the firm conviction established in the minds of the English people, after years of trial, that the people of their cities could not be given proper service at a minimum fare, unless the entire service of the city were coördinated under one agency, whether or not this agency were private parties, such as in London itself, or handled by the municipalities, such as in Birmingham, Liverpool, Glasgow, Edinburgh and other places visited.

When one first reaches London and is driven through the streets in a taxicab to his hotel, he is very forcibly struck by the absolute absence of street-railway track in what is known as "Old London," which is the name applied to the main section of the town, about one mile square, and which has a day population of approximately 400,000, and a night population of about 20,000. A very short study of "Old London," with its very crooked, narrow, never parallel, and ever dead-ending streets, soon convinces one of the impossibility of street-railway tracks in that district. A double-track street-railway could not be constructed on the narrow streets, nor around the many curves from one street to another; nor is it possible to find any two parallel streets by which one street could be used for one direction and the other street for the opposite direction. The only way to have a tramway in this section of "Old London" is underground, and the underground railway system of London is very extensive indeed, and, under the guidance of Lord Ashfield, who is now chairman and managing director of the London Electric Railways & Associated Companies, a very excellent and satisfactory service has been developed.

Being a firm believer in the coöordination under one management of all transportation facilities, with a wide degree of public regulation of such management, Lord Ashfield has succeeded in consolidating ten different underground and tramway companies with the London General Omnibus Company, operating in Old and Greater London, and has even gone so far as to secure a coördination of transportation facilities through the arrangement of the London General Omnibus Company for through bookings with the London County Council Tramways at the tramway dead-ends in the various communities. This coöperation is noteworthy for the reason that for years the London General Omnibus Company and the London County Council Tramways (a municipal undertaking) have been bitter competitors.

Further, as a means to better the service to the public, the advisory committee of the Ministry of Transport, in its special regulations for 'buses, provided that 'buses may not be hailed at any point, but must have four definitely marked, regular stops and two optional stopping places in each mile of route. This total of 6 stops a mile compares with our total of 10 to 15 stops a mile, and helps greatly in the average speed per hour of their 'buses.

It has been often stated that the traffic of London is handled by the 'bus service. A visit to Old London and the observance of the enormous morning and evening rush to and from the underground railways will soon dispel this idea, and at the same time would dispel the idea of the possibility of any 'bus service in the narrow London streets being able to cope with the problem of the mass transportation in the rush hours. During the normal hours of the day the 'buses are very popular, and it is not surprising that when the figures of the entire traffic of Greater London are got together, it is found that the 'buses carry approximately 30 per cent. of the total, while the underground and suburban railways carry about 40 per cent. and the tramways about 30 per cent.

The consolidation of the 'buses with the underground has permitted very economical despatching to conform to weather conditions. On rainy weekdays the traffic on the 'buses falls off approximately 25 per cent as compared with a good day, and on a rainy Sunday it is barely 50 per cent. of a good Sunday. Fewer 'buses and more subway trains are, therefore, run in bad weather, and *vice versa*.

The charge for the rides in London, as well as in all other places throughout the British Isles, is based on the zone system, wherein a minimum fare of from 2 to 4 cents will permit a ride (varying in different localities) of from one-half to one mile, with increasing rates for longer distances.

The short rides may be cheap, as is often referred to in America, but one taking a long ride, such as is possible in any of our American cities, and such as were taken by us in London, we found the fare as high as 48 cents, where in New York the same ride would cost 5 cents, and in other places from 7 to 10 cents.

In order to take care of the increased cost of operation, the minimum fare for the shortest ride, which has formerly been 2 cents, had been raised 50 per cent. to 3 cents. This 50 per cent. increase caused a falling off of short-haul traffic of only 4 per cent.

In London is the largest development of 'bus operation in the world, operating as they do approximately 3,000 'buses, carrying close to 1,000,000,000 passengers each year on about 150 different routes. We were, however, very much impressed with the fact that the London 'buses themselves do not compare, either in looks or in riding qualities with the late types of 'buses being used in this country.

Outside London, Birmingham, Liverpool, Glasgow, Edinburgh, York, Leeds, Bradford, Sheffield, Nottingham and other cities, we found all the city transportation owned and operated by the municipalties themselves, and in every one of these places, with the exception of Edinburgh, experience had taught that to give proper service to their people at a minimum cost, it was impossible to permit actual competition of 'buses with the tramways. Where such competition had actually been started in any of these cities, the competing companies had finally been purchased and the cities were so operating these 'bus lines

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that they were an auxiliary or an extension service instead of a competitive service.

In cities such as Birmingham, where outside 'bus lines were permitted to enter and operate in the city, an extra high initial fare is required to be charged on the 'buses, where they overlap the tramway in the center of the city, in order to avoid competition with the tramway service and reserve the 'buses for long-distance travel.

The operating costs, as given us by the various managers, are interesting, but differ to such an extent that we feel they are not altogether comparable. For instance, in Birmingham, we were given an operating expense per car-mile of the tram cars, 38.88 cents, for the 'buses, 45.18 cents; while in Liverpool we were given, for the tram-car operation, 47.82 cents, and in Glasgow 43.22 cents. Again in Edinburgh, we were given the figures 30.806 cents for electric operation, for cable operation 41.804 cents, and 39.26 cents for 'bus operation. In New York, we were given 35.58 cents for electric operation and 23.06 cents for "trackless trolley" operation. In Leeds we were given 34.40 cents for electric operation and 28.50 cents for "trackless trolley" operation; while in Sheffield we were given 35.96 cents for electric operation, and 46.54 cents for gasolene 'bus operation.

H. E. Blain, managing director, London General Omnibus Company, is now, always has been, and likely always will be, convinced that the gasolene 'bus is the best method, but admitted that it was necessary to have a subway system, or some other such system, to take care of the mass transportation of the morning and evening rush-hours. James Dalrymple, general manager, Glasgow Municipal Tramways, is a stand-patter for the use of the tramways, and has as yet no 'buses or other forms of transportation in Glasgow, although he does admit it is likely he will in the future install some 'bus lines in order to avoid the heavy cost of present-day construction of tramway extensions. R. S. Pilcher, general manager, Edinburgh Corporation Tramways, is now using 'buses to supplement car service. In York they are using a "trackless trolley" for the purpose of augmenting their present service. In Leeds J. B. Hamilton, general manager, Leeds City Tramways, is using gasolene 'buses for his lightest traffic, and the "trackless trolley" for medium traffic, where good roads are available, but feels that the tramway must be the backbone of the transportation system. In Bradford R. H. Wilkinson, general manager, Bradford Corporation Tramways, is a strong advocate of the "trackless trolley," and feels that this is the only method to supplement and augment his tramway service, which must bear the main burden of the transportation service.

Curiously, at Sheffield, the very next city we visited after Bradford—and quite adjacent to Bradford—A. R. Fearnley, general manager, Sheffield Corporation Tramways, is just as strong an advocate of the gasolene 'bus as Mr. Wilkinson, of Bradford, is of the "trackless trolley." Sheffield, with its population of 500,000 people, has only 79 miles of track, or only one mile to every 6,300 people, so that Mr. Fearnley has quite an opportunity to supplement his tramway service with other forms of transportation.

In a paper presented at the conference of the Municipal Tramways Association in 1919 Mr. Fearnley expressed himself as follows:

(1) The gasolene motor 'bus is an excellent vehicle in acting as a feeder to tramway routes.

(2) The gasolene motor 'bus is an unsuitable vehicle for satisfactory dealing with heavy town traffic.

(3) The gasolene motor 'bus is quite inadequate for dealing with Sheffield peak loads.

(4) The gasolene motor 'bus is financially impossible at tramway rates of fare.

(5) The gasolene motor 'bus has no advantage over tramways in regard to average speed maintained during the day.

General Factory Hauling at $1.26 a Ton

By N. C. McCLURE
Maintenance Engineer, Toledo Scale Company, Toledo, Ohio

OUR motor truck does three distinct lines of work. First, it hauls our raw material from the freight-depots to the plant; second, it hauls material in process between our five plants; third, it hauls the finished scales to the freight-depot for shipment.

This truck is of 1¼-ton capacity, was 16 months old October 1, 1921, and has been doing very satisfactory work in spite of local disadvantages. For example, though the truck is working all day long, its average daily mileage is very low. This is largely due to the amount of time lost at the steamboat docks, freight-depots, and the various plants. The docks in particular are not large enough to handle the material which is put through them every day, so altogether about half the truck's time is spent waiting to load or unload.

For the month of June the record of this truck showed 250 trips, carrying 184 tons over 579 miles. Of the 279 working hours available, 125 were spent at the docks, and 9 hours used in repairing punctures, greasing and oiling. Sixty-nine gallons of gasolene and 22 pints of oil were used. The wages for the month were $142.00.

In the month of July the truck again made 250 trips, carrying 186 tons over 413 miles. The available hours were 218, of which 147 were spent at the docks, and 4 hours in supplying grease and oil. Fifty-three gallons of gasolene and 16 pints of oil were consumed. The wages totalled $186.00.

In August the truck made 273 trips, carrying 245 tons over 487 miles. The hours available were 223, of which 141 were spent at the docks, and 6 to repair punctures and to grease and oil the machine. Fifty-seven gallons of gasolene and 6 pints of oil were consumed. The wages totalled $141.00.

During the month of September 235 trips were made, carrying 250 tons of material over 365 miles. The hours available were 214, of which 131 were spent at the docks, and 2 hours in fixing punctures. Fifty-three gallons of gasolene and 9 pints of oil were consumed. The wages amounted to $139.00.

Handling 865 tons of material in the four months on this tonnage, cost us $1.26 per ton, and $1.38 per ton-mile. These costs are considerably lower than we should have to pay for doing the same work with horses, and the service is much better and more dependable. These figures, however, cover only the base operating cost items with added interest, etc., as noted. The overhead charges are not included. No garage has been charged, because at the present time the truck stands in one of the loading docks. Administrative overhead is omitted because this truck is under a department that handles shipping, packing, etc., so that it would be very difficult to figure the proportion of overhead to charge against this truck.

OPERATION.	
Days operated	100
Miles traveled	1,844
Miles per day	18.44
Miles per gallon of gasolene	7.9
Miles per gallon of oil	278
AVERAGE COST.	
Cost per day (including driver)	$ 10.93
Cost per mile	.5926
Total cost for period	1,092.80
ITEMIZED COST.	
Driver cost per day	$6.08
Depreciation per mile	.0662
Maintenance and repair:	
Actual, total	.00
Actual, per mile	.00
Estimated, per mile	.02
Tire cost, estimated, per mile	.0893

Trade in Argentina

The past year has been a poor one for the automotive business in Argentina, particularly affecting the importation of American vehicles. Only 723 cars and 121 trucks were imported during the year, or about 5 per cent. of the imports for the year 1920. These figures do not include the lowest-priced American machines, which are brought in knocked down.

The year 1921 began with a stock of approximately 3,500 vehicles in the Buenos Aires custom-house. More than half of the 1921 imports were entered during the first three months of the year and were on old contracts. Sales improved at the opening of the spring season in September, and the stock in the custom-house was withdrawn by the end of the year. Importations have now been resumed, although sales this season (December, January, and February) are on a reduced scale, due to the lack of ready money. There are few sales of high-priced machines. Of the total, 121 trucks imported, only 5 were American, most of the others being German.

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Dirigible 2-Wheel Trailer for Handling Long Loads

FACILITATES OPERATION IN TRAFFIC

The transport of lengthy loads, such as timber, girders, etc., has always presented a problem of some difficulty, especially from the point of view of avoiding unnecessary obstruction in crowded or narrow thoroughfares and of allowing freedom of movement in confined spaces. Loads of unusual length can, of course, be carried on a single 4-wheel vehicle in several ways, but this method has its limitations as regards overall length, and it necessitates considerable care on the part of the driver, especially when rounding corners. The use of an ordinary 2-wheel trailer for supporting the rear end of a lengthy load of which the front is carried by an ordinary truck is, in some respects, preferable to the single vehicle method, though the arrangement is by no means ideal, as the wheels of the trailer only track with those of the tractor vehicle when following a straight course. Then, again, when turning round corners careful steering is necessary, and in some cases the vehicles have to be backed and moved forward again several times before the trailer and rear end of the load can be made to clear obstructions.

This problem has received the serious attention of the Societe Anonyme Adolph Saurer, which has developed what appears to be a very satisfactory solution.

The outstanding feature of the Saurer method of transporting lengthy loads is the use of a special 2-wheel dirigible trailer. The axle and pivoting rubber-tired wheels of this vehicle are similar to those of a standard chassis. On the axle is mounted, by means of semi-elliptic springs, a short channel frame carrying a fixed superstructure which supports the rear end of the load. One of the frame side members is utilized for carrying a steering control box and hand-wheel with the usual drop arm and connections to the pivoting wheels. A seat is provided for the steersman, and this is so placed that he has an uninterrupted view ahead, so that he can easily guide the trailer so that its wheels follow in the tracks of the hauling vehicle. The latter is an ordinary Saurer truck, carrying on its platform a swivelling bolster, by which the front end of a lengthy load is supported. The combination has a total carrying capacity of 8 tons, while the distance between the two vehicles depends, of course, on the length of the load carried. When not in use the trailer is turned about and coupled direct to the rear end of the truck frame. It is also provided with a 3-legged stay so that it can stand alone. The load is prevented from falling off by means of steel stanchions on each side. These are merely inserted in sockets in the supporting members of the two vehicles at distances apart to suit requirements.

With an arrangement of this kind (which practically constitutes the equivalent of a flexible 6-wheeler) very lengthy loads of timber, etc., can be transported through crowded traffic and round corners with a minimum of inconvenience or obstruction to other road users, as the steersman on the trailer is able to guide the latter to either side of the road, as may be required, to avoid other vehicles and to the best possible advantage when making awkward turnings.

On highways of about 10 feet 6 inches width and with a width between buildings of 19 feet, and when carrying a load nearly 46 feet long with a rear overhang of 13 feet from the center of the trailer and with a distance of 26 feet between the latter and the rear axle of the hauling vehicle—under such conditions, if the hauling vehicle is steered so that the outside front wheel describes a circle of 26 feet radius the rear end of the load describes a circle of 30 feet 4 inches radius, while the front end follows a curve of 11½ feet radius.

A special loading apparatus for handling long lengths of timber consists of a hand-operated windlass with two gear-ratios for loading heavy and light timber respectively. From the windlass a steel cable is taken over a pulley supported between two upright members stayed by a third, and the end is attached to a convenient point of the frame. The windlass apparatus can be fitted either to the right or left-hand side of the truck and trailer turntables, and on the other side are attached two inclined bearers, up which the timbers can be rolled by means of the steel cables. For this operation the cables are paid out sufficiently to be slipped over the ends of the timber, when, by winding the cables on the windlasses, the timber is rolled up the inclined bearers and stacked in position for transport. By means of a single attachment the windlasses can be carried beneath the platform of the tractor vehicle when they are not required.

Motor Aids Machinery Sales

A Boston machinery salesman, looking for something new in the line of high-power salesmanship, has struck on the novel idea of mounting a complete machine shop attachment on the rear of a motor vehicle. With it he goes on his daily round of calls, and the peculiar device is becoming a familiar sight in all the highways.

The rear of the vehicle carries, among other apparatus, a grinding machine, which can be used in shops and garages for grinding pistons, valves, wrist-pins, or for any kind of general machine work. Forty feet of wire is always carried, which may be plugged into an electric socket, so that immediate operation is possible almost everywhere.

Lee H. Campbell, the owner, is using the machine-shop on wheels as an ingenious method of boosting his sales. He is now establishing dealers to buy the complete outfit, and they in turn will canvass the shops and garages.

It Is Now Mack Trucks, Inc.

The stockholders of the International Motor Company, maker of Mack trucks, have voted to change the company's name to Mack Trucks, Inc. The old directors have been reëlected.

Repair and Maintenance Under Two Cents a Mile

GENERAL HAULING AT 92 CENTS A TON

"Our 3½-ton truck has done 4½ years of heavy hauling, during which it has traveled nearly 70,000 miles," says Nicholas Chieppo, professional hauler of New Haven, Connecticut. "It was purchased in March, 1917, and has worked steadily ever since, with the exception of the 15 days it was taken out of service for overhauling.

"The truck's principal job is hauling flour for the Pillsbury Company, the Thompson Milling Company, and the other big milling companies in New Haven. This flour is delivered to bakers, grocers and hotels all over the city. Frequent deliveries are also made to nearby cities, such as Bridgeport, Branford and Guilford. As a rule the milling companies ship the flour to us, and we store it until ordered to deliver it to their customers.

"The truck averages 7 trips a day, and makes about 5 stops to the trip. It carries a driver and 3 helpers, for we have found that the 3 extra men more than pay for themselves in time saved in loading and unloading. The truck averages from 30 to 100 miles a day, depending on the nature of the deliveries. If they are all in New Haven, the distance is not over 30 miles. But if we have to make a couple of trips to Bridgeport, it easily travels 100 miles. The average is 50 miles a day.

"Usually the flour is carried in 98-pound sacks, and averages about 80 sacks to the load. This means a load of 4 tons, which is the average. If the flour is in barrels, we carry about 40 to the load.

"The Selden truck has proved very economical to operate. In its 4½ years' service, the actual cost of repair and maintenance has been only $1,200, which amounts to less than 2 cents a mile. This figure includes a thorough overhaul which the truck had.

"On an average 50-mile day, carrying 28 tons on 7 trips and making 35 deliveries, our costs are:

Fixed charges	$ 2.13
Variable charges	6.30
Driver's wages (including 3 helpers)	17.18
Cost per day	25.62
Cost per ton	.92

"One of our best customers is the National Folding Paper Box Company of New Haven, and for 5 months we hauled its products to New York City, a distance of 84 miles each way. The entire round trip was always made the same day and the truck usually got back by 9 o'clock at night. Sometimes we increased our profits by picking up a return load in New York. When we had no return load, the costs were $38.90 for the trip. The hauling cost with a 5-ton load was $7.78 per ton, and 9.26 cents per ton-mile. Our profit for the trip was only $3.10, as against $44.10 when we had a return load.

"These figures indicate the profits which can be made with a truck. If it wasn't profitable to own a truck we shouldn't have kept ours for 4½ years. In a few weeks we are going to buy another Selden.

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Co-ordination Impossible Between Rails and 'Buses

MOTORS HAVE HURT RAILWAY BUSINESS

"The electric railway viewpoint is that the position of the motor trucks and motor 'buses is that of competition and not of coördination," said Paul Shoup, president of the Pacific Electric Railway Company of California, in an address before the American Electric Railway Association. "We are taking the facts as we find them. In California the electric railways have found the motor 'bus and the motor truck a competitive force of transportation, taking advantage of our highway systems, and very destructive to the electric railway interests, which have had a hard enough time to survive the competition of the privately operated automobile and the great increase in the burden of their expenses. It is impossible for these electric railways with their experience, none being immune, to feel that motor 'bus and motor truck transportation should be classed with them or that the suggestion should be entertained that the two be coördinated, since such coördination is absolutely impossible under existing conditions. Every electric railway in California has suffered severely from this competition. Each one has had to make its battle against the unfair features of such competition, none of them escaping this difficulty. There is not an interurban railway in California but has to devote a large part of the time of some of its officers and directors in fighting applications before the State Railroad Commission for new permits.

"The electric railways in California have had a bitter and costly experience in dealing with the competition of the motor 'bus subsidized through the use of highway systems of the state and its subdivisions. These companies have $350,000,000 invested out there, and the experience has ruined a considerable part of this investment, probably, in connection with these motor 'buses and motor trucks operated in competition with the electric railways. In no sense can they find any ground for coördinating the companies operating motor 'buses and trucks with companies operating electric railways. Their ideas are wholly divergent matters of taxation, matters of legislation, matters even of accidents—in these respects their ideas are wholly divergent. The largest motor 'bus company of our state during the first nine months of 1921 had 300 accidents, which cost them a large sum of money, and it is only recently that the State Railroad Commission has made the regulation requiring these vehicles to stop at all steam and electric railway crossings. We have nothing in common with them as the situation is now.

"Coördination between the companies of the one kind and another, under conditions which now exist, can not be brought about. They are our competitors, they have destroyed our properties, and they took advantage of a situation that was not properly controlled by the public at the time they began this work, and which is now gradually coming under better public regulations. Therefore, with the distressing and bitter results of this competition before us, we do not feel that there can be any coördination, but we do not mean that there should not be some auxiliary service where electric railways can not, for the time being, extend their lines; but there can not be any coördination as between the motor 'bus companies and the electric railway companies in any manner whatsoever. I have no doubt that there will be a bitter fight in the State of California during the next session of the legislature as to the nature of the taxation and regulation that is to be imposed on motor 'buses and motor trucks. We know there is a feeling that they should not be permitted any longer under new applications to parallel electric and steam lines, and under those conditions we are not apt to get together in any matter of policy."

Highway Traffic Meeting

The annual meeting of the National Highway Traffic Association will be held at the Automobile Club of America, 247 West 54th Street, New York City, on May 12. The afternoon and evening sessions will be devoted to consideration of the reports of the following committees: National Committee on "Uniform Highway Signs"; National Committee on "Traffic Capacity and Widths of Highways Outside Municipalities"; National Committees on "Status of the Construction of Highway Curves and Recommended Practice to Increase safety to Traffic"; Executive Committee on "Highway Improvement Creed" of the National Highway Traffic Association; National Committee on "Regulations Governing Speeds, Weights and Dimensions of Motor Trucks and Trailers"; National Committee on "License Fees and Motor Vehicle Taxation"; National Committee on "Highway Transport Franchises"; and National Committee on "Highway Transport Clearing Houses."

Trucks Carry Tokio's Sewage

The City of Tokio has purchased a fleet of 47 trucks to be used for the disposal of sewage. Of these, 35 are 1-ton Fords, pneumatic-tired, which will be fitted with covered rack bodies of Japanese construction. The remaining 12 are 2½-ton Packards, complete with electric starting and lighting equipment and solid tires. Eight of the Packards will have Japanese-made vertical hoists and steel dump bodies, and the remainder will be fitted with ordinary platform and stake bodies.

These trucks will be used to convey the night-soil from the residential districts to the outskirts of the city, where it is sold to the farmers. Tokio, like all Oriental cities, has no regular sewer system, and the use of motor transportation for the disposal of sewage has long been advocated by local motor dealers. If other Japanese cities follow Tokio's lead in this matter, a new and large market for motor trucks will be opened. The night-soil has been previously transported by hand-cars pulled by coolies.

According to the latest assessors' returns in Colorado, there were 4,497 tractors in use in this state as compared with 3,613 reported for 1920 and 2,253 for 1919.

Truck Owner Keeps Double Check on Operating Costs

DISCLOSES ERRORS AND INEFFICIENCY

Of interest to all owners and managers of motor truck fleets is the ingenious, and at the same time, simple and efficient method of checking cost records as devised and put into operation by D. A. Glover, traffic manager in charge of the fleet of thirty-one 5½-ton Packard trucks in the service of the Gustave Rader Company of Brooklyn, large dealer in building materials.

"An analysis of Mr. Glover's system," says W. B. Brister, transportation engineer for the Packard Motor Car Company of New York, "discloses the fact that he has what might be called a 'double entry' system. That is, he gets his data from two different sets of records. He thus has at all times a perfect check on his truck costs.

"His first set of records is the national standard truck cost system, and consists of daily drivers' records which are posted to a monthly sheet and then averaged. Information thus obtained shows: Number of trips, mileage, loading time, running time, gasolene consumption, and oil consumption.

"To check these figures, Mr. Glover has his other record. This is his own system and consists of a detailed summary of the identical information obtained from the driver, this time however, obtained from the following sources: Number of trips (shipping clerk's records), mileage (nightly reading of hubometer on each truck), loading time (shipping clerk's records), running time (shipping clerk's records), gasolene consumption (supply requisitions), and oil consumption (supply requisitions).

"Repair charges are in both cases charged directly by the repair department.

"This double checking system detects all errors, leaks and inefficient drivers. The advantages of having this up-to-the-minute knowledge of all operating and maintenance expenses can easily be seen. Mr. Glover can tell when and where a man or truck is 'falling down on the job,' just where time is being lost, or where needless expense is being incurred. The actual cost figures are not available for publication, but they prove beyond a doubt that this close check on every item of expense is keeping the transportation end of the Gustave Rader Company as near 100 per cent. efficient as is possible."

Rank of States in Road Work

Nebraska ranks third among states in the Union in the mileage of roads built, under construction, or under agreement for construction in conjunction with federal aid funds since July 1, 1916. Texas holds the lead with 2,485.7 miles of improved road; Minnesota comes second with 1,713.4 miles, and Nebraska third with 1,512.4 miles. Iowa follow close with 1,509.2 and Georgia comes next with 1,053.8 miles. No other states show a total of 1,000 miles or over. The estimated cost of construction of Nebraska's roads is $8,479,456.27, of which $4,142,468.38 is federal aid.

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On Organizing Motor Transport

By JAMES PATERSON

THE factors determining the nature of a distributing system for a great city are: (1) Geographical features, (2) public requirements, and (3) vehicles and load handling arrangements available. Distribution requirements are: (1) from rail or ship to wholesale warehouse; (2) from warehouse to retailer, and (3) from retailer to private premises. The first requirement is largely fulfilled by boats, the other two by road. The paper is more immediately concerned with these two latter.

The wholesale warehouses of different trades are more or less segregated, but the present tendency to live outside cities means that often a vehicle must cover several miles to distribute the daily requirements of, say, 30 families, whereas formerly the needs for the same number could be met in a single street.

The public also requires distribution at reasonable cost, calculated on a system simple enough for the average citizen to determine whether he is being fairly charged. Therefore, the simplest practicable classification is suggested, and as payment is often made to the man who delivers or collects, the problem becomes different from one in which charges are dealt with by a clerical staff.

The public also demands prompt attention with quick and safe transit. If only one in 2,000 packages leads to inquiry, and only one in four inquiries proves well founded, confidence in this respect should be retained.

There is also a desire to be able to entrust goods to a carrier on the understanding that they may be delivered only in exchange for payment to the driver.

Broadly speaking, in deciding what to use for delivery work one should take the number of deliveries and collections of a normal day's work, with an average of so many minutes allowed for each, which will give the actual time of standing still. Variations in this figure are caused by exceptional circumstances, such as value having to be collected for an unusual number of packages, an unusually large average size of packages, or much carrying along inaccessible drives or upstairs flats. The best vehicle is that which will cover the distance in time to make the day's work come out right without habitual overtime.

Employment of a man or boy assistant is only justified if thereby the time for deliveries can be reduced to allow of sufficient additional deliveries to pay the additional wages, and it is suggested that such justification can very rarely be proved.

A 2-ton gasolene truck on delivery work, averaging 40 miles daily, totalling 12,000 miles a year and averaging one hundred deliveries daily, will cost $3,750 a year, or $12.50 a day, inclusive of interest, depreciation, repairs, fuel, etc., garage, union wages, and mechanical management, but excluding commercial management and direction. [These are London costs.—ED.] One hundred daily packages at $12.50 means 12½ cents per package actual net delivery cost, apart from collection, handling, clerkage, commercial expenses, etc., and 100 deliveries a day is a very high efficiency performance, for the 40 miles a day, averaging 10 miles per hour, takes 4 hours, leaving only the 40-hour half of the day for the 100 deliveries.

On regular routes engine power and gears should enable, say, 80 per cent. of the running time to be at the maximum efficiency point. Trailers are only justified when the weight on the vehicle is below the engine's capacity and when speed is not material. Rarely is a trailer economical except for bulky traffic like household removals.

For delivery the floor should be as large as possible to enable loads to be put on in the order that they are to be taken off, and for this purpose lighting for winter adds to efficiency.

Increased use of movable bodies is of special interest. One concern uses a runaway plant to lift a body with 4 tons and traverse it, so that a vehicle can be at once unloaded on arrival and leave with a body previously fully loaded. The machine will be out on the street in 10 minutes against one hour for loading and unloading with fixed body, even assuming in the latter case a free bay is available.

A runaway development which has not yet entirely been put into practice affords a sorting station with incoming and outgoing platforms, and with a runway along which travelling jennies can move bodies to and from each platform, and a shelf where spare bodies can await their turn. The jennies all travel in the same direction, on the principle of the luggage handling plant at Victoria Station, Manchester.

The guiding principles of carriage are: (1) A full carriage yields lowest cost per article carried; (2) transship as seldom as possible, and never unless the cost of transhipment is outweighed by the saving effected; (3) the shorter time you keep something belonging to someone else the less likely you are to hurt it; (4) more haste, less speed; (5) every article you lose or break and every over-charge is a nail in your own coffin; and (6) for every complaint you hear, ten others do not reach you.

A system built up on these considerations consists of two central sorting stations, one in the commercial London center, the other in the West End, each with vehicles for collection and delivery in the area around itself. Each station loads direct by transfer cars to all suburban depots with sufficient traffic to produce regular full loads. All transfer cars run to time-table, the departures being timed by the hour when full loads are available for each, and arrivals timed so that loads can be off-loaded and put on to the depot delivery vehicles in time for their rounds at an hour convenient to the various classes of recipients. Return journeys are governed by similar considerations, including the men's meal hour and the closing time of railway freight and parcels departments. As far as possible back loads for railways are confined to certain cars for a special depot, whence the goods are transferred to rail. Hitherto in London it has been difficult to insure as many complete return loads as outwards, but as factories are springing up in the outer districts this balance is being redressed.

Above a certain size sorting platforms become less and less economical in working. Hence, in the London center, the curious development of two side by side, each big enough to load directly to everywhere, and each fully equipped as a terminal not only for loads for its own system, but those brought in by any car owners for distribution or collection. The site for the original of these two stations was selected to deal with barge traffic and to be on the principal road to the commercial center of London and the docks.

When a car has to travel some miles to reach its ground the cost of so doing is greater than that of transferring by a bigger car to a depot and resorting. For point to point transit, a 4-ton vehicle is generally used, though much can be said in favor of both smaller and larger ones. Mileage averages 18,000 a year or 60 miles daily, a very good performance being 6½ hours moving and 1½ at terminals. At present the cost will probably be about 28 cents a mile. Whenever a group of consignments can be delivered direct from a central sorting station more cheaply than by resorting at a depot, this should be done. This is particularly the case with merchandise such as clothes and food from wholesale warehouses to suburban centers.

Against direct delivery from the center is the system of the large sender sorting at his own warehouse into loads for the particular area depots, so that goods can be taken direct from warehouses to depot and these off-loaded and distributed by local vehicles. It may be asked whether the terminal costs of this off-loading and distribution outweigh the saving by use of a smaller distribution vehicle. This will be more likely as the number of separate consignments and the distance to their destinations increase. Where factors are favorable, distribution cost is lessened accordingly as the number of district delivery vehicles is large in proportion to the area worked. The more machines the smaller the area for each; the less the distance, the shorter is the moving time, and the more packages collected and delivered in the day's work.

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Finally, there is the direct service from wholesale warehouses to retailer, or from retailer to the private house without the intervention of sorting station or delivery depot. A certain amount of traffic is thus handled, as, for instance, by the big retail stores, although at higher operating costs than through depots. Still, the advertisement carried by the vehicle, the perishable nature of the traffic, and direct touch with the customer compensate. Nevertheless, continued higher operating costs are ultimately borne by the purchaser.

In the London district there are two peak periods, but that in October is higher because people are laying in winter clothing heavier than the summer clothing they are buying in May. December is average in spite of Christmas, for the following week is absolutely blank. In winter depression is partly alleviated by the sales and in summer by the holiday-makers.

There is thus opening to create special traffic at slack times, but the carrier of goods can not relieve congestion by allowing strap-hanging or unkindly preventing husband and wife travelling together in the morning by offering the lady cheap midday fares to "pull her off the peak." Yet as in passenger work, to-day's work must be done to-day, and everything once it starts should move right on to the end of its journey. In a complex distribution system congestion at any point must be avoided; no express goods can be put aside in transit; everything must be got right to its destination, however heavy or unexpected the day's traffic may be. One way of achieving this is by having certain hours during which each depot must be clear of goods, or only contain such as can be explained by some good reason, such as early closing day. Perishable traffic must have priority at all cost.

German Motor Exports

During December, 1921, 968 cars, trucks and chassis were exported from Germany. They were distributed as follows: Holland 21.5 per cent., Belgium 17 per cent., Sweden 9 per cent., Spain 9 per cent., Denmark 8 per cent., southeastern Asia 6.6 per cent., South American 2.7 per cent., United States 2.2 per cent., Switzerland 1.6 per cent., Austria 1.5 per cent., all other countries less than 1 per cent. each.

Compared with November, the December exports show a slight decrease. However, the total weight of the 968 machines exported during December exceeds by far the weight of the 1,000 exported during November, from which one may assume that more trucks were exported during December.

Export figures for the four months, January to April, 1921, have not been published. The total number of cars exported from May to December amounted to 5,810.

A reduction of 75 cents in the round-trip fare between New Albany and Corydon, Indiana, has been announced by the Southern Railway Company in an attempt to regain the traffic lost by it through the competition of motor 'bus lines connecting the two places.

Fenn Sees Big Opportunity for Trained Transport Men

REVIEWS HUGE TRUCK DEVELOPMENTS

"In the next ten years 4,000 specially trained men will be needed for service in the highway transport business," declared F. W. Fenn, secretary, National Motor Truck Committee, National Automobile Chamber of Commerce, in a recent address before the students and faculty of the Massachusetts Institute of Technology. Mr. Fenn said in part:

"The whole field of highway transport is practically virgin. It welcomes the entrance of trained men. Men of the very highest professional ability are daily turning to it; only recently a former governor entered the field.

"The success of the experiment in allocating to motor trucks the interchange of freight among the eight railroads entering Cincinnati, which has resulted in eliminating 300,000 switching cuts, is going to mean its duplication in every major terminal center. It is fairly certain that the next great development in this country in transportation will be, therefore, a national delivery service for picking up traffic at the point of origin and making delivery at the store-door of the consignee. The motor truck offers the best solution of this problem in the opinion of many railroad officials. Only this past month the transportation of freight between the New Jersey rail terminals of the Erie Railroad and New York City has been effected by means of trucks.

"It is now an established fact that motor truck operation can be substituted for short branch-line railway operation, trap-car service, suburban railroad and terminal distribution. The New York, New Haven & Hartford Railroad, the Baltimore & Ohio and the Northern Pacific are already using trucks with flanged wheels on short branch-line operations."

Mr. Fenn called attention to the fact that the committee on the development of the motor 'bus of the New England Street-Railway Club recommended at its last monthly meeting that in many instances it would be preferable to install motor 'bus service instead of "trackless trolley" equipment. This was felt by the speaker to be the logical development in urban passenger transportation. There are now 20,000 motor 'buses servicing the congested and undeveloped areas of our principal cities.

It was also pointed out that approximately 75 per cent. of the hauling in the Texas and Oklahoma oil-fields is carried on by means of specially designed truck and trailer combinations. Mr. Fenn said that "there is no question but that the motor truck is a very important part of the operator's equipment in the production of petroleum. The impressive sizes to which the truck fleets of some of the largest oil companies in the world have grown during the past few years is a striking confirmation of this assumption.

"There is every reason to believe also that in the transportation of coal and other mine products from the mouth of mines there will be from now on a marked tendency to utilize power trucks. Just how extensive this movement will be may perhaps be judged from the fact that the products of approximately 3,200 mines are being carried by either motor truck or wagons at present.

"Just a short time ago the opinion was ventured by several prominent lumbermen that within the next three years all mules and oxen now in use in southern lumbering will be replaced by tractors and trucks. Various methods of transportation have been employed from time to time in the handling of our forest products; but in the last few years lumbermen in general have displayed a keenness for inquiry and observation that has resulted in the development and use of many new devices, especially trucks, intended to save both time and money for lumber producers."

Oppose Fleet Owner Discounts

Very substantial progress is being made by the Agents' Section, Ltd., of England, to bring the manufacturers of accessories (lamps, speedometers and lighting sets) into line with the manufacturers in refusing discounts of any sort to motor truck owners with less than seven vehicles. A letter addressed to the Motor Trade Association manufacturers, asking if they would be willing to agree to such a condition has produced replies which on analysis appear to be very encouraging. The proportion of firms agreeing is 66 per cent., and the proportion agreeing on condition that other manufacturers do the same is 27 per cent. Only 7 per cent. disagree. A number of firms have yet to reply, but if the same average of acceptances and conditional acceptances is kept up, there should be no serious obstacle in the way of this long overdue reform being accomplished.

Some of the replies may be quoted. The following for instance is based on the rather exploded notion that the trade is out to take advantage of the community:

"We have noticed in recent years that the tendency of trade societies rather tends to increase prices to consumers than to decrease them, and believe that the trade's best interests are bound up with those of the public in doing all in its power to increase competition and thus through greater enterprise reduce costs and prices to the consumer. Therefore we are opposed to any action which results in keeping prices up to their present high level. We are expressing our opinion in a general way, but can not see why a small truck user should not have the same benefits of discounts as a large user. By discriminating between the two we are handicapping the small trader, which is again the interests of the community at large."

Another firm while agreeing to the arrangement expresses the opinion that the qualifying number of vehicles should be over two. It holds the view that truck users having three or more vehicles should have the advantage of a 10 per cent. discount off accessories and that in practice the owner of three to six vehicles will generally get some concession from the agents, and it is best, therefore, to recognize it

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Big Tractor-Trailer System Serves Grocer Efficiently

400 STORES ARE REGULARLY SUPPLIED

System has for a long time been a significant business watchword. In spite of the fact that a good many crimes against efficiency have been committed in its name, it is nevertheless as valuable as ever when correctly applied. Thomas Roulston, who operates a chain of about 400 retail grocery stores, has given an excellent example of a carefully planned system of the kind that proves itself by results.

The distributing center of the Roulston chain is in Brooklyn, and the majority of the stores are there. A number of them are on Staten Island and the rest are at different points on Long Island. The store which is farthest from the central office is at Patchogue, about 65 miles away.

About eight years ago the Roulston company supplied all its stores by means of horse-drawn equipment, but at that time the branches served a much smaller area than they do to-day. With the development of motor transportation, it became clear that the retention of horse-drawn equipment would impede the growth of the business and, consequently, horses were given up and the delivery system of the company was completely motorized.

Tractors and semi-trailers are used for delivering all articles except bread, which is handled separately from the other products because of its perishable nature. Twenty trucks, the majority of which are light models, are engaged in delivering bread to the Roulston stores. Among them, however, are four 2-ton Macks which handle the larger loads and do most of the long-distance work.

The shipment of the bulk of other products distributed by the Roulston chain is handled by an extremely efficient tractor-trailer system. The loading of each trailer is put in charge of one man who accompanies the driver of the tractor when deliveries are made. Since he supervised the loading of the trailer, he is familiar with the packages which are destined for the several stores. He carries with him the shipment invoices for the store manager. At each stop, the manager checks the number of packages left without delaying the tractor to see that the packages are correct. A copy of the shipment invoice is mailed to the store manager for the purpose of confirmation.

On the return trip, the empty boxes and containers are picked up and taken back to the warehouse. At the warehouse, the tractor backs the trailer up to the platform and helpers jack up the trailer, allowing the tractor to pull out from under it. The tractor then backs up to a loaded trailer and goes out for another round of deliveries. As it ordinarily takes about 2 hours to load a trailer, and since less than 5 minutes are consumed by the tractor in the process of leaving one trailer and being hitched to another, it may be readily seen that an enormous economy is effected in reducing to a minimum the time that the tractors are obliged to stand idle.

Each driver carries with him a card on which the store managers mark the time of arrival and of departure of the tractor. In this way, excessively long running or waiting time is immediately detected and investigated. It has been found profitable to use the tractor-trailer system for even the shortest runs.

The maintenance of the trucks and tractors is as systematic as the delivery methods. The drivers are not expected to do the work of skilled mechanics. If the driver notices that some part of the truck is not in good condition, he makes a report in writing in the "trouble book" when he returns to the garage. The driver is held responsible for reporting troubles promptly and for keeping his motor supplied with oil and gasolene. Otherwise, the condition of the trucks is in the hands of skilled mechanics.

At any hour during the day or night there is always someone on duty at the company's garage to take care of repair work, eliminating as much delay as possible. The personnel of this department consists of a blacksmith, four mechanics and two helpers. Once a week the mechanics thoroughly inspect each truck, lubricating every part, and making any necessary adjustments.

During the year 1921, Thomas Roulston added thirteen 10-ton Mack tractors and four 2-ton Macks to his motor equipment. According to the garage superintendent, two Macks purchased in April, 1921, made over 15,000 miles in the first six months of operation.

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and fix the allowance. It is mainly a matter for the agent, and if a really representative meeting of both agents and manufacturers agree that there is no objection to withdrawing these discounts from all users of less than seven vehicles, it is quite willing to agree although thinking it is a mistake.

One lamp manufacturer would eliminate discounts to even larger users than the owners of seven vehicles. Its practice is to only allow discount off lamps to a few selected users who buy in very large quantities. The trade is obligated to supply lamps at net list in all other cases. It considers the practice of allowance of a discount of 10 per cent. to users of even over seven trucks undesirable.

A firm of jobbers takes a line which approaches the ideal, and is likely to be appreciated by every retail firm. Ever since the inauguration of truck users' terms this firm decided not to touch the business in any shape or form. It considered, then, that business with truck owners should be dealt with by the retail agents, and not by the jobbers and it still adheres to this policy, and should like to see, if it were possible, truck discounts abolished altogether.

Production of the 1-ton truck has now reached 50 per cent. of the total output of the Ford factory in Manchester, England.

Tire Users Told Reasons for Guarantee Withdrawal

FORMER PRACTICE IS HELD UNSOUND

The Tire Manufacturers' Division of the Rubber Association of America is sending a message to tire users to 125,000 tire dealers throughout the country explaining the warranty situation. The standard warranty defines the manufacturer's responsibility as follows:

"We do not guarantee pneumatic automobile tires for any specific mileage, but every pneumatic automobile tire bearing our name and serial number is warranted by us to be free from defects in workmanship and material.

"Tires claimed to be defective will be received only when all transportation charges are prepaid, and when accompanied by this company's claim form duly filled out and signed by owner. If, upon examination, it is our judgment that the direct cause of the failure of the tire to render satisfactory service is attributable to faulty material or workmanship, we will, at our option, either repair the tire or replace it for a charge which will compensate for the service rendered by the returned tire, based upon its general appearance and condition."

The new conditions are better for the consumer because they mean—

More equal treatment of users.

Less controversy between dealers and consumers.

Elimination of abuses which have hampered manufacturers' efforts at tire economy.

The selling quality instead of a too liberal adjustment policy.

The usual fair treatment of careful users —but only fair treatment of others.

More sound merchandising by manufacturer and dealer.

A letter sent the tire dealers sets forth that "The unsoundness of the former tire adjustment conditions is emphasized by the fact that clothing, footwear, household appliances and innumerable articles of utility (which are subject to service under conditions which the manufacturer cannot control or ascertain) are not sold with a definite guarantee of service and an unsoundly liberal adjustment policy. There is apparently no good reason why tires should be an exception.

"Entirely too many of the adjustments formerly made were what the industry knows as 'policy' adjustments. The dealer loses most by that kind of an adjustment because each tire thus furnished prevents a new sale by some dealer. It is no exaggeration to say that 'policy' adjustments annually took millions of dollars from the pickets of the dealers alone.

"Under the standard warranty and claim form, only those tires which are faulty in material or workmanship will be considered for adjustment and then only upon the basis outlined in the second paragraph of the warranty. Tires cannot be adjusted if run on wheels out of alignment, on snaky wheels or with lugs improperly tightened, causing unusual wear, or if damaged by either cuts, jabs or stone bruises, or by underinflation or overloading.

"For the dealer, the new condition will eliminate much annoyance and loss of profit and it should remove all apprehension that some other dealer is going to do the thing that you know to be unsound and unbusinesslike. The consumer will benefit because formerly the careful user had to carry the burden created by the careless user. Now each user will pay

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Large Gotham Grocer Finds Electrics Very Economical

IS CONSIDERING ELIMINATING HORSES

One of the most important elements in the present methods of food distribution is the local delivery system, of which that of the Acker, Merrall & Condit Company, New York, is typical, says the *Edison Monthly*. Ten years ago the company began looking about for a way to reduce the cost of deliveries and finally decided upon the purchase of electric trucks. Since that time the fleet of storage battery vehicles has been augmented until it now comprises three 750-pound cars, one 1-ton truck, one 5-ton truck and nine 3½-ton trucks. The three 750-pound cars are a recent addition to the fleet and were purchased as a result of earlier experience, for electric trucks had proved so economical and satisfactory in making the bulk deliveries from the warehouse to the retail stores that it was believed possible to have them supplant horses for neighborhood delivery. At the 72d Street and 102d Street branch stores of the Acker, Merrall & Condit Company these three vehicles are now being used and the results obtained have led to the conclusion that no type of delivery wagon is so well suited to the work. Thomas B. Fisher, sales manager and a director of the firm, speaking of these cars, says: "We are seriously considering the replacement of all our horses by light electrics of this type."

While the smaller size wagons are used for retail delivery work, the larger trucks are employed in the haulage of wholesale orders and are always sent out loaded to capacity. The 3½-ton trucks travel on an average about 25 miles a day and most of the time is spent in carrying groceries from the company's warehouses to its branch stores. Electric trucks are used for suburban runs as far as Greenwich, Connecticut; Yonkers and Rye, New York; Flushing, Long Island; Long Branch, New Jersey, and adjacent points. In this kind of work and in delivering wholesale orders to hotels, clubs and restaurants, the 5-ton truck has a current consumption of 18 kilowatt-hours a day, while the 3½-ton trucks, which cover a greater territory, use about 30 kilowatt-hours a day. All the electric trucks placed in service ten years ago are still in daily operation.

Canned goods, fancy groceries and delicacies of almost every description are purveyed by the Acker, Merrall & Condit Company. Haulage from railroad to warehouse is also done by the storage-battery vehicles and at the company's loading platforms charging outlets are installed which make it possible to charge the trucks while boxes, cases and barrels are placed aboard. This results in a great saving of time and eliminates possible delay in filling orders.

Here also another advantage of machines is evident, for they occupy less space at the loading platform than horses. This factor is important, for with horses the platform must either be set far back from the building line, which necessitates more and costly floor room or the vehicles project on the street and interfere with traffic.

As a means of reducing overhead delivery cost to a minimum, the company maintains a public garage at 532-540 West 46th Street where not only its own trucks are kept but those of other firms as well. The same care and attention that keep the company's trucks in service every day is given the trucks of the garage customers. This is such a well recognized fact that fifty outside firms now use the service of the Acker, Merrall & Condit garage.

Here every facility for the proper maintenance of electric trucks and batteries is at hand. An expert repair section is in operation and the trucks are gone over each night to see that they are in perfect condition for the next day's work. It is in a great measure due to this service that the trucks of the company, and the trucks of its garage customers, are proving so economical and are finding such a long term of usefulness.

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his own way. If the tire is defective the owner can get fair treatment provided he makes a claim in the specified manner.

"You can do very effective work in bringing about the change, because of your direct contact with the tire purchaser. You not only have an opportunity to assist in bringing about a change which will prove of great benefit to you as a merchant, but you have also a moral obligation to promote the new plan in the interest of the user of tires, for the new conditions will operate to the advantage of the tire buying public as a whole. It should not be difficult for you to establish the new practice if you will remember that substantially the whole tire manufacturing industry is in sympathy with it, and that consequently the car owner is unlikely to secure undeserved allowances from your competitors, selling some other manufacturer's tire. Likewise, when the tire user understands that the new conditions are applied everywhere and that they are more fair to all, he will be a customer who is better served and more satisfied, and he will have a greater respect for the tire industry."

"Don't Hamper Motor 'Bus"

Restrictions of motor 'buses should be limited to safety requirements, in the opinion of H. H. Franklin, head of the Franklin Manufacturing Company.

"If the public chooses to travel by motor 'bus, it should have the unrestricted privilege," he said. "If the motor 'bus can not give a cheaper and better transportation, it will not survive. There should be no restriction on the number of 'buses or 'bus lines even between the same points. There is no justification whatever for the excessive taxation. The motor 'bus or truck should not be taxed in any greater proportion than other vehicles. Let competition and experience shape the future of the motor 'bus, not restrictive regulation."

The Department of Agriculture estimates that 86,560,000 tons of major crops are hauled over the highways annually. Illinois is credited with the greatest tonnage, hauling 8,855,000 tons.

Profit of $176,800 Taken by Federal Truck in 1921

SALES AMOUNTED TO $3,268,468.00

Conditions existing throughout the motor truck industry last year are reflected in the annual report of the Federal Motor Truck Company, Detroit. Total sales of this manufacturer for the year ended December 31, 1921, were $3,268,468, which compares with total sales of $10,628,742. Operations for the year resulted in profits of $176,800. Net profits for 1920 were $745,878 before deducting for federal taxes which were estimated then to be about $200,000.

The balance sheet as of December 31, 1921, lists total assets and liabilities of $3,533,326 as against $4,525,340 the previous year. For the purpose of comparison the 1921 and 1920 reports are given in condensed form.

During 1921 inventories were reduced from $2,497,398 to $1,521,050 at the close of the year. Other assets shown on the 1921 statement include: Cash, $165,301; accounts receivable, $256,209; investments, $158,100; plant accounts, $1,407,855; and deferred charges, $24,811.

Liabilities are listed as follows: Accounts payable, $104,439 (a substantial reduction from the $352,734 of 1920); dealers' deposits, $23,986; reserves for depreciation, $419,186; accrued expenses, $42,527; land contracts, $238,360; capital stock, $2,000,000. Surplus is shown as $704,828, which compares with the 1920 surplus of $806,812, which was subject to government taxes estimated at $200,000.

Assets.	1921.	1920.
Cash	$ 165,301	$ 163,293
Accounts receivable	256,209	228,811
Investments	158,100	192,505
Merchandise inventories	1,521,050	2,497,398
Plant accounts	1,407,855	1,383,249
Deferred charges	24,811	60,084
Total	$3,533,326	$4,525,340
Liabilities.		
Accounts payable	$ 104,439	$ 352,734
Dealers' deposits	23,986	31,844
Reserves for depreciation, etc.	419,186	577,650
Accrued expense	42,527	61,848
Government advances	.....	359,092
Land contracts	238,360	335,360
Capital stock	2,000,000	2,000,000
Surplus	704,828	*806,812
Total	$3,533,326	$4,525,340

*Subject to government taxes for 1920, estimated at $200,000.

Saves Plant from Flood

The Transport truck factory, flooded with six inches of water on the morning of February 22, was in full operation 24 hours later, in spite of the fact that outside electrical power was completely cut off. Transport's own power-plant and several Fordson tractors made this possible. The entire organization promptly set to work digging trenches to drain off the water and place all material up high and dry. With vacuum pumps in the boiler-house completely submerged under 10 feet of water in their pits, two tractors and two 8-inch centrifugal pumps were put to work to maintain heat in the building. As soon as the water was cleaned away, other tractors were put in operation to run the machiery and thus keep up production.

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Truckmen Oppose British Railways

By OBSERVER

THE prospect of the railroads being able to obtain permission to operate motor trucks on the highways continues to be a topic of lively discussion in England. There is every indication that Parliament will see a big fight over the attempt of the North-Western and Midland group of railways to obtain powers to provide and use road vehicles. The parliamentary bill promoted by the group will meet with vigorous opposition organized by the commercial road transport associations.

The main argument of the opposition is that the passing of the bill would confer on the railway companies a monopoly of inland transport, while its defeat would secure to traders free choice of competitive service. The railway companies have gone a long way to meet the objections raised last year. No attempt is now made to obtain unrestricted running powers, the proposed area of their operations being confined to the limits of the group. The objection of manufacturers of motor vehicles that the companies would manufacture their own vehicles and thus put private manufacturers out of business is met by a clause providing that: "Nothing in this act shall empower the company to manufacture any road vehicles which they provide, own, work, or use." They will be able to argue, therefore, that, instead of injuring, they will give a tremendous stimulus to the motor industry.

An attempt is also made in the bill to meet the objection that the railways, with their huge resources, will be able to cut rates for road transport until they have driven existing transport companies off the roads and established a monopoly. The railway companies are willing to agree, if possible, with the organizations as to the rates to be fixed, and in the bill itself they agree to submit their rates to the Railway Rates Tribunal set up under the Railways Act, 1921. Since the tribunal will be hardly likely to agree to uneconomic rates, the road transport rates of the railway companies will be fixed, while the private companies will be at liberty to undercut, and will thus be fully safeguarded against unfair competition. Further, by the provision that the railway accounts for road transport work must be kept separately, the Rates Tribunal will be able to determine whether the rates charged are economic or not.

The railway view is that, far from killing the existing road transport organizations, the railways may find that with their road transport service controlled as is proposed, competition may be so highly organized against them that they will not be able to establish services in many districts. That would involve a lowering of rates by the road transport companies which would be to the benefit of the shipper. At present the difference between railway rates and road transport rates is very great, and the road-haulage contractor has a large working margin within which he can raise his rates and still undercut the railway rates. Last year many millions of tons of traffic were diverted from the railways to the roads, and it is only by entering themselves on road haulage that they can hope to regain it.

No attempt, however, has been made by the railway companies to meet the objection that there is great danger to the public in the probability that the men employed on railway road vehicles would belong to railway trade unions, and would thereby accentuate the effects of a railway stoppage. The view is taken that the spirit of harmony between the leaders of the unions and the leading officials of the railways has never been better, and that this point can safely be left to the good sense of the leaders.

Nevertheless, there is a steadily growing volume of protest against the private bills, and, swelling the volume, the North-Western Group of Commercial Road Transport Associations has just issued an important statement, which contains certain points that have received but little attention in the past.

After outlining how the railways, owing to greater speed and capacity, superseded the roads and bought up the canals (which thenceforward declined through lack of development), the statement emphasizes the fact that road transport has been evolved by private enterprise. Though the North-Eastern and Great Eastern Railways since 1904 have possessed road powers, they have done little to develop road services in the public interest. Thus by now thousands of road transport undertakings represent a very large capital. But when the work of others had proved the new transport advantageous, the railway companies desired to run road services to check the new competition, so the Minister of Transport appointed a committee to consider the subject. In the findings of this committee, issued in March, 1921, the majority report (including the shippers' representatives) and the labor report were opposed to railway companies being given road transport powers, and even the minority report only favored such powers if they were "restricted and limited," though it is hardly possible to conceive any restrictions or safeguards proof against the danger of monopoly. Now that the canal systems have declined, the one and only serious competitor of the railway is road transport, and this only for a small portion of the total traffic handled by the railway companies. Removal of competition would destroy the only incentive of the railway companies to improve their existing methods.

A new and important point is made from the report on the Advisory Committee on General Revision of Railway Rates and Charges, 1920 (upon which the Railways Act was to a great extent based), which points out:

"If a shipper can secure cheaper rates for carriage by water or by road than by rail, with equal convenience, he will not avail himself of transport by rail, and this competition can not be ignored."

And further, regarding collection and delivery:

"The railways will be subject to the competition of ordinary carters."

It is obvious, therefore, that the members of the committee considered that competition from outside would remain.

Another point is made that, though by the Railways Act, 1921, the Rates Tribunal may fix rates which will secure to the railways a fixed return on capital under economical and efficient management, it is extremely difficult to decide whether the railways are being "economically and efficiently managed," the tribunal possibly may have to accept such figures as the railways see fit to submit.

Under such an arrangement, if the road took away traffic from the rail, the railway rates would have to be sufficient to give a fixed return on this capital and would become higher and higher as rail traffic decreased. If the railway services fail, the cost of that failure must be put upon shippers who send traffic by rail. Railway returns show that in the last two years losses on goods services operated by railway companies amounted to $168,755 in 1919 and $162,015 in 1920. These deficits obviously have to be covered by the rail-borne traffic.

Owing to the present general stagnation of trade, there is a shortage of rail traffic, and to withdraw capital for a new enterprise from funds provided for railway development must inevitably keep up the present high railway rates at a time when relief in this respect is eagerly awaited. The state of the money market is not opportune for the raising of new capital for such a project, seeing that owing to present trade conditions there is a large surplus of vehicles that have been put on the road by private capital and enterprise.

The Automobile Association & Motor Union on behalf of its Industrial Vehicle Section has sent a letter to all members of Parliament setting out very fully the case for the owners and user of commercial motor vehicles. The letter, which emphasizes the serious precedent involved in these private bills, as well as the danger to the economic and national interests which are at stake, reads in part as follows:

"The present proposals, which in the first instance are being put forward by (*a*) the Western Group of English Railways and (*b*) the West Scottish Group of Railways, are contained in private bills, which, if

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sanctioned by Parliament, will give the companies concerned wide powers:

(*a*) To operate road transport for goods and passengers, irrespective of whether the traffic has been or will be in contact with the railway systems.

(*b*) To charge such rates and fares as they may please, subject only to certain provisions of the Railway and Canal Traffic Acts.

(*c*) To set up their own depots, garages, etc.

And once the precedent is established in this bill, it may be safely assumed that other railway companies in Great Britain will follow with applications for similar wide powers.

"The serious possibilities of the situation which would thus be created can not be too strongly emphasized, in view of the grouping proposals sanctioned by the Railways Act, 1921, which in effect set up complete railway monopolies in the various parts of the country. Cheap road transport is today a national necessity, and to preserve this it is essential that there should be healthy competition. It is submitted that, with their enormous financial backing, it would be a comparatively easy matter for the railway companies to wipe out of existence all the present individual firms engaged in motor haulage, or the char-à-bancs business, thereby creating what would be virtually a monopoly in transport by road as well as by rail.

"As regards the setting up of garages and depots by the railway companies, this would have a most undesirable effect on the great number of small garages throughout the country, which depend so largely on the trade derived from through passenger and goods-carrying traffic. The existence of these wayside garages is essential to the use of all types of motor vehicles—whether private car or cycle, truck or char-à-bancs—and, in the opinion of the association, these facilities would be gravely jeopardized if the railway companies' proposals are eventually approved by Parliament.

"A matter of great importance to the public also arises when this question is considered in relation to national emergencies, where possibly one form of transport may be immobilized. In the past, alternative forms of transport have enabled the country to carry on. Obviously, if all forms of transport were under the same control and affected by the same disputes, complete paralysis would be unavoidable."

The organization of the National Association of Motor Truck Industries at Detroit on March 21 marked the beginning of a closer relation and broader scope of the motor truck industry. At this organization meeting M. L. Pulcher, vice-president and general manager of the Federal Motor Truck Company, was elected president. A campaign has been laid out whereby the parts makers will coöperate with the truck makers to improve conditions in the industry. "It is the object of the association also," says Mr. Pulcher, "to solve transportation problems from the standpoint of the truck owner, so that the industry may keep pace with the demands of traffic."

White Shows Truck Sales of $30,329,948 Last Year

WERE 57 PER CENT. OF 1920 BUSINESS

The report of the White Company for the year ended December 31, 1921, shows gross sales of $30,329,948 compared with $51,998,122 for 1920. The balance sheet compares with those of other years as follows:

BALANCE SHEET.

Assets.

	1921.	1920.	1919.	1918.
Property account	$ 8,261,728	$ 8,606,859	$ 5,864,856	$ 4,902,978
Good will, patents, etc.	5,388,910	5,388,910	5,388,910	5,388,910
Inventories	13,351,452	22,989,073	15,728,141	10,156,558
Accounts receivable	2,838,394	4,738,068	4,931,598	5,422,498
Notes receivable	2,571,731	2,026,976	1,140,256	1,011,520
Cash	1,346,442	1,472,329	1,031,786	817,653
Government securities	165,875	161,988	5,311,000	1,886,800
Employes' unpaid bond subscriptions	.....	.....	47,603	466,652
Other assets	310,000	.....	.....	.....
Depreciation	.....	445,000	562,500	240,000
Miscellaneous accounts receivable	73,362	120,970	97,612	42,373
Deferred accounts	269,095	339,266	149,174	117,870
Total	$34,576,989	$46,289,439	$40,253,436	$30,453,812

Liabilities.

Capital stock	$25,000,000	$25,000,000	$24,604,850	$16,000,000
Notes payable	3,600,000	7,200,000	500,000	1,000,000
Accounts payable, etc.	1,972,810	3,105,698	3,423,779	2,298,060
Depreciation on cars	106,885	130,288	186,887	62,058
Accrued taxes	235,631	81,141	58,864	32,218
Contingent reserve	1,000,000	2,000,000	2,000,000	740,000
Tax reserve	.....	300,000	1,600,000	3,700,000
Surplus	2,661,663	8,472,312	7,879,056	6,621,476
Total	$34,576,989	$46,289,439	$40,253,436	$30,453,812

INCOME ACCOUNT.

	1921.	1920.	1919.	1918.
Operating loss	*$4,394,848	†$2,292,776	†$4,983,371	†$5,947,494
Other income	214,607	417,238	746,504	433,091
Total loss	$4,180,241	†$2,710,014	†$5,729,875	†$6,380,585
Fed. after tax	.....	300,000	1,600,000	3,700,000
Interest, etc.	657,078	.....	.....	.....
Reserve	.....	.....	1,260,000	.....
Deficit	$4,837,319	‡$2,410,014	‡$2,869,875	‡$2,680,586
Dividends	2,000,000	2,000,000	1,440,000	1,280,000
Deficit	$6,837,319	‡$410,014	‡$1,429,875	‡$1,400,586
Previous surplus	8,472,311	7,879,055	6,621,475	5,216,300
Tax adjustment, etc.	‖1,026,671	183,242	§172,295	4,590
Profit and loss surplus	$2,661,663	$8,472,311	$7,879,055	$6,621,476

*Operating loss after deducting manufacturing, selling and other expenses; also $2,048,023 reduction of inventories to approximate market value or replacement cost. §Debit. †Profit. ‡Surplus. ‖Includes $1,000,000 portion of contingency reserve previously carried—transferred to surplus.

In his remarks to stockholders, Walter C. White, vice-president, says in part:

"We entered the year 1921 with very large inventories and commitments which had been made necessary by the period of extraordinary expansion which began during the war. These inventories were priced at the then values, but drastic deflation and readjustments of 1921 made further large inventory adjustments inevitable, and in order to reduce this item to cost or market (whichever was lower) at the end of 1921, further inventory adjustments of $2,048,023.36 were made.

"Gross sales were $30,329,948, compared with $51,998,122 for 1920. Figures show that the total value of truck sales for 1921 were 32 per cent. of the sales for 1920. Our truck sales on the same basis were 57 per cent. of our 1920 business, and our proportion of the entire business increased from 8.6 per cent in 1920, to 15.5 per cent. in 1921, an improvement of 6.9 per cent. in our relative position.

"After years of constant effort to increase our output to a maximum, we, in order to reduce the stock on hand, reduced our factory production to a minimum. This afforded an opportunity to put into effect many of the economies of manufacture and selling, the importance of which had long been appreciated, but the adoption of which had been precluded by the necessities of peak production. Sound, careful, conservative management, long experience and a broad view of general conditions throughout the world, were never of greater importance in preparation for what we believe will be a period of the keenest competition of the generation.

"The demand for motor trucks has shown more firmness, and a slow, steady and constant improvement since last October. We firmly believe that business in general, as well as our own business, is distinctly on the up-grade.

"With our inventories largely reduced, and priced at present values, with our selling expenses as nearly commensurate as possible with the volume of sales reasonably to be expected, with our plant and manufacturing organization in the best condition they have ever been, we, today, are in a better competitive position than ever before to market our trucks and have sound reason to anticipate that we will continue to secure an increasing proportion of the entire truck business. We feel justified in hoping that a profit will be shown at the end of the year."

February orders for nearly 700 trucks were larger than any month in 1921. Shipments are not quite so satisfactory, as many orders call for special equipment. White is producing around 80 trucks weekly, and expects to increase this to 150 by July 1.

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Large Paris Firm Derives Economy from Pneumatics

ENTIRE FLEET CHANGED FROM SOLIDS

Interesting comparisons between the cost of solid and pneumatic tires on trucks are presented in a statement given out by one of the biggest motor transport companies in France, which handles the entire delivery work of such representative concerns as Galeries Lafayette, Printemps, etc. The special value of the comparison arises from the fact that the two types of tires have been used in identical forms of service under identical conditions, at least as nearly as it is possible to duplicate them in the general run of business. This firm formerly used solid-tired vehicles exclusively, but has gradually transformed its fleet, solely on the money showing made, until the entire fleet—composed for the most part of 3-ton vehicles with van bodies—is now running on pneumatics. The machines are fitted with tires measuring 953x 135 millimeters; single in front and dual in the rear.

The company states that the cost of running its vehicles on pneumatics is 2.64 francs per kilometer, while the cost on solids is 2.652 francs, or a difference of 0.28 franc per kilometer in favor of the pneumatic. Owing to the constant fluctuations, and the different standard of living costs in France and the United States, any attempt at conversion from currency of the one country to that of the other might be merely misleading, nor could it be permanently exact. Therefore, the costs are left in francs. The comparative value of the figures, however, remains unimpaired. In American currency, therefore, at par gold value for the franc, the total running cost of these machines is equivalent to 80.304 cents a mile on pneumatics and 81.072 cents on solids, showing an advantage of .768 cent a mile in favor of the pneumatic.

The pneumatic tire and wheel equipment of each 3-ton truck costs 7,501 francs, or, with such accessories as levers, jack, pressure indicator, etc., 7,806 francs. Estimating that one tube will outlast two casings, and that the life of the latter will average 10,000 kilometers (6,213 miles), the actual tire cost for this distance will be 4,584 francs, or 45.8 centimes per kilometer for 3-ton trucks. Translated into miles and American currency, and taking the franc at its nominal value, the tire maintenance charges are 13.92 cents per mile.

For solid tires the cost is given as 16 centimes per kilometer, on the basis of 6 solid tires costing 400 francs each, or a total of 2,400 francs, and a distance of 15,000 kilometers, or 9,320 miles. This is equivalent to 4.872 cents a mile.

The real advantage of pneumatic over solid tires is found, according to this firm, in lower depreciation and maintenance costs. The cost of a solid tired truck, namely, 50,000 francs, is written off after 150,000 kilometers (93,000 miles), which gives a charge of 33.4 centimes per kilometer. For the same class of vehicle equipped with pneumatic tires depreciation works out at 23.4 centimes, on the basis of a life of 250,000 kilometers (155,343 miles), for a vehicle costing 50,000 francs, plus 8,600 francs for its tire equipment. Further economies are made in maintenance costs, running repairs, and spare parts, by the use of pneumatic tires, the charges being 20 centimes per kilometer for the air-filled tire and 35 for the solid.

With a solid-tired truck a general overhaul must be undertaken every 25,000 kilometers (15,530 miles), at a cost of 5,500 francs, or at the rate of 22 centimes per kilometer. Equipped with pneumatics, the same work has to be done only every 40,000 kilometers (24,850 miles) at the same total cost; but the kilometer charge thus drops to 13.7 centimes.

A fleet of ten pneumatic-tired trucks can be kept in regular service with one reserve vehicle, whereas when solid tires are used there must be two reserve vehicles. The initial cost of 11 trucks is 550,000 francs, plus 7,806 francs each vehicle for tires and wheels, plus a fixed charge of 8,760 francs for compressed-air trucks and an air-compressor for the fleet, making a total outlay of 644,620 francs. For solid-tired trucks the outlay is 50,000 multiplied by 12 or 600,000 francs.

The interest on capital tied up in the pneumatic-tired trucks, at 6 per cent., is 38,677 francs, which, on the basis of 100 kilometers covered per day, works out at 10.5 centimes per kilometer. With solid tires the interest is 36,000 francs, or at the rate of 9.8 centimes per kilometer. In this connection it should be pointed out that the solid-tired truck has been placed at an unnecessary disadvantage compared with the pneumatic, for the distance covered on pneumatics will certainly be higher than on solids: if this had been taken into consideration, the interest charges on capital would probably have been lower for pneumatics than for solids.

Overhead charges are considered to be the same whether pneumatic or solid tires are used, and are based at 81 centimes per kilometer.

Summarized, the comparative costs work out as follows:

Items of Cost.	With Solid Tires. Fr.	With Pneumatic Tires. Fr.
Tire	0.16	0.458
Depreciation	.334	.234
Maintenance and running repairs	.220	.137
Overhaul and general repairs	.350	.200
Interest on capital	.098	.105
Fuel	.680	.680
Overhead	.810	.810
Total	2.652	2.624

Although the general conclusion is favorable to the pneumatic, and the firm from which the figures have been obtained has shown its faith in the pneumatic by using it exclusively, it is impossible to credit it with undue optimism. It might, for instance, be pointed out that there would undoubtedly be an appreciable economy in gasolene by the use of pneumatic tires. On considering capital charges the price of a truck has been considered to be equal to that of a solid-tired truck plus the charge for wheels and tires. It is obvious, however, that an allowance should have been made for the fixed wheels and solid tires of the original equipment, or only such amount added as represents the increased value of pneumatics over solids.

British Roads May Buy Trucks

The group of British railways which is seeking legislative sanction to start a motor road service has offered two modifications to allay the increasing organized opposition to the proposals. The companies agree not to concern themselves with passenger service and not to undertake to build motor trucks for their use. The former waiver interests 'bus lines particularly and the latter truck manufacturers. If the legislation is sanctioned, it will probably mean an order for 5,000 motor trucks, chiefly from 1 to 3½-ton capacity. As service will be an essential feature it would seem that truck makers would be able both to build and undertake maintenance of the trucks on a contract basis.

Yellow Cab in Strong Position

Earnings of the Yellow Cab Manufacturing Company, Chicago, for 1921 amounted to $607,654, of which $254,208 was in the final six-month period and $353,446 in the first half-year. The earned surplus on January 21, 1922, after deductions of federal taxes and of dividends on the class "A" and "B" stock was $403,046. The total surplus, which included the capital surplus of $845,800, was $1,248,836. The ratio of current assets to current liabilities as disclosed on the company's balance sheet was 3⅛ to one, current assets being $2,690,868, while current liabilities were only $849,019, including tax reserves. Total assets and liabilities were $3,304,423.

Ursus in Difficulties

Stockholders of the Ursus Motors Company, Chicago, incorporated at $1,000,000, have filed a suit for a receiver in the Circuit Court. The bill alleges that 4,000 stockholders have been fraudulently deprived of approximately $1,000,000. According to the bill, the company was formed to manufacture tractors and farm implements, and the money received has not been used for manufacturing purposes.

In Fitchburg, Massachusetts, Wachusett Motors, Inc., will bid for business with a 2½-ton motor truck, assembled of Continental, Timken and Brown-Lipe units, and to be known as the Wachusett. F. S. Suthergreen is the president of the new concern, W. C. Dresser is vice-president, F. H. Brown is treasurer, and R. H. Bingham secretary.

A new concern has been organized in Kenosha, Wisconsin, to manufacture motor trucks; its capitalization is $2 250,000. The moving factors in the business are William Martinson, formerly first vice-president of the Winther Motor Truck Company, and Charles T. Abbott, formerly that concern's secretary, and the new venture will be known as Martinson Motors, Inc.

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New Traffic Ordinance Now Ready for New York Council

WOULD REGULATE PEDESTRIAN TRAVEL

The redraft of the traffic ordinances of New York City was introduced in the Board of Aldermen recently and hearings on it will be held in a short time. Last spring much time and study were spent in recodifying and redrafting the ordinances regulating traffic in that city. All suggestions were referred to a special committee on traffic regulations of which Alderman Charles H. Haubert was chairman. This ordinance died in committee when the old board went out of office on January 1 this year, and was reintroduced by Alderman Hannoch of the Bronx. The provisions of the new ordinance are:

1.—No person under 16 years of age shall drive or be allowed to do so, unless by permit of the police department.

2.—A signal of intention must be given before turning corners, turning around, stopping, starting, backing, abruptly slowing, or in any way changing the course of the vehicle, and the signal must be plainly visible from the rear. The signal "may be by hand or arm, but only when same is visible as aforesaid; or by some mechanical or electrical device visible at all times of night and day and approved by the police commissioner."

3.—"When a motor vehicle either approaches or is about to turn a corner and at all other times when prudence and safety require, but not otherwise, the person in charge thereof shall give reasonable and timely warning by suitable audible signal should any other vehicle or any pedestrian be likely to be endangered. Such signal shall be loud enough to be plainly heard but not so as to startle or confuse."

4.—"No vehicle shall be allowed to remain upon or be driven through any street so as to blockade or obstruct the traffic of that street."

5.—A motor vehicle shall not be allowed to stand upon a street "when unattended by some person competent to control the same unless emergency brakes are set." When stopping on a grade, the front wheels shall be turned to the curb (when there is one). It prohibits any "unauthorized person" from sounding the horn, tampering with or trespassing upon the vehicle or starting it in motion, except in emergency.

6.—The old ordinance prohibiting any one from riding on the back of the vehicle without the consent of the driver is changed to read so that no portion of any person shall protrude beyond the limits of any part of the vehicle.

7.—The right of way now lies with any vehicle approaching from the right. This establishes in the city the generally accepted custom of giving the vehicle approaching from the right the right of way, at any intersection, with the proviso of course, "that wherever traffic officers are stationed they shall have full power to regulate traffic."

8.—This section establishes by ordinance the right of the police to affix "one way" signs.

9.—This section lists the vehicles having precedence in their order which are:

"The officers and men of the fire department and of the fire patrol with their apparatus of all kinds, when going to, or on duty at, or returning from a fire; all ambulances, whether of public or private character, and all other vehicles when employed in carrying sick or injured persons to hospitals or places for relief or treatment; vehicles carrying the United States mail; vehicles of the several bureaus of buildings; emergency vehicles of the department of water supply, gas and electricity and of public service corporations, and vehicles of all physicians who have a police permit shall have the right of way in any street and through any procession."

10.—No person shall operate, drive or propel, and no owner thereof riding thereon or therein shall cause to permit to be operated, driven or propelled, on any street or public place, any bicycle, tricycle, velocipede, motorcycle, motor tricycle, motor delivery wagon, or motor vehicle however propelled, or any vehicle drawn by horses or other animals, recklessly or negligently, or at a speed or in a manner so as to endanger, or to be likely to endanger the life or limb or property of any person. Except as herein otherwise provided, a rate of speed exceeding 15 miles per hour for commercial vehicles used for hauling or crating, weighing less than 3,500 pounds, unladen, or for passenger vehicles shall constitute prima facie evidence of a prohibited rate of speed and manner of driving, and of a violation of the provisions of this section; a rate of speed for such vehicles exceeding 20 miles per hour shall constitute a prohibited rate of speed and manner of driving, and a violation of the provisions of this section, and a rate of speed exceeding 25 miles per hour for such vehicles on a public highway which passed through country or outlying sections that are substantially undeveloped and sparcely settled, shall constitute a prohibited rate of speed and manner of driving, and violation of the provisions of this section. Except as otherwise herein provided, a rate of speed exceeding 15 miles per hour for commercial vehicles used for hauling or carting, weighing 3,500 pounds or more, unladen, shall constitute a prohibited rate of speed and manner of driving and a violation of the provisions of this section, and a rate of speed exceeding 20 miles per hour for such vehicles, on a public highway which passes through country or outlying sections that are substantially undeveloped and sparsely settled, shall constitute a prohibited rate of speed and manner of driving and a violation of the provisions of this section.

11.—The old ordinance limiting the speed to 8 miles per hour in the lower section of Manhattan or on streets on which there is an elevated railroad is repealed.

12.—This section provides that in crossing or approaching an intersecting street in which there are car tracks in the congested sections of the city the speed shall not be greater than 10 miles per hour for all vehicles. It also prohibits a rate of speed in excess of 20 miles per hour on any bridge.

13.—This section changes the speed at which a vehicle may turn a corner from 4 to 8 miles an hour.

14.—Prohibits a vehicle from passing or approaching to the right or left closer than 8 feet to any part of a street-car when standing to take on or discharge passengers.

15.—This gives the police department right to post signs limiting speeds to 8 miles per hour on streets congested by vehicular or pedestrian traffic and to enforce it.

16.—"No person shall, without permission in writing from the Police Commissioner, operate or drive, on any street, or on any bridge, a motor truck or trailer, having a width of body inclusive of load of more than 8 feet, or having a height from pavement to top of vehicle or load of more than 12 feet 6 inches, or having a combined weight of truck and load or of trailer and load of more than 30,000 pounds, the load to be so distributed that there shall not be more than 1,000 pounds per inch in width of tire on any one wheel, or having a length of body inclusive of load of more than 28 feet in the case of a motor truck, or more than 18 feet in the case of a trailer, or having wheels equipped with other than rubber tires.

17.—Requires all commercial motor cars, trucks and omnibuses to have a rear vision mirror properly adjusted so as to give the driver a clear view of the road and traffic behind his vehicle.

18.—Prohibits parades in the Borough of Manhattan with certain exceptions.

19.—Requires that all motor trucks of 3,500 pounds weight or over unladen, shall have the correct unladen weight legibly displayed on them.

20.—This is the first attempt in New York to regulate pedestrian traffic and its results will be watched with great interest. "Pedestrians shall not cross a street at a point distant less than 150 feet from a regular crosswalk. Pedestrians, in crossing streets, shall at all times obey the direction of police officers conveyed by voice or gesture."

The ordinance is to take effect 30 days after signing by the mayor.

Many Trucks Overloaded

Every third truck on the Hartford-Springfield road and the Boston Post road in Connecticut was loaded beyond the capacity of the truck and the tires, according to a report covering two weeks of investigation on each roadway conducted by the Bureau of Public Roads of the United States Department of Agriculture, in coöperation with the Connecticut State Highway Department. Overloading occurred on all types of trucks, but was most common on the trucks of 3- to 5-ton capacity. One 3-ton truck was found to have a 62 per cent. overload. It was found that 89 per cent. of the trucks on regular trucking lines had a total weight of truck and load in excess of 12½ tons, the maximum weight allowed by law in the state.

The State of Manzanillo, Mexico, has only 20 trucks, all located in the capital, Colima. In Cuidad Guzman, State of Jalisco, there are 8, and in Cuyutlan, State of Colima, only 1.

EXPORTS OF MOTOR TRUCKS, JANUARY, 1922.

COUNTRIES.	MOTOR TRUCKS AND 'BUSES — 1-ton and less. (No.)	(Value)	1¼- to 2½-tons. (No.)	(Value)	Over 2½-ton. (No.)	(Value)	Total. (No.)	(Value)	ELECTRIC TRUCKS AND CARS. (No.)	(Value)
Belgium	..	.....	19	$8,193	...	.....	19	$8,193	...	.....
Denmark	..	.....	1	1,000	...	.....	1	1,000	...	.....
Netherlands	42	$21,607	...	.....	...	.....	42	21,607	...	.....
Spain	1	1,116	1	1,100	...	.....	2	2,216	...	.....
Sweden	1	396	...	.....	...	.....	1	396	6	$8,750
Turkey in Europe	..	.....	2	734	...	.....	2	734	...	.....
England	..	.....	1	2,014	...	.....	1	2,014	...	.....
Canada—										
Quebec and Ontario	2	1,245	27	29,614	7	$15,884	36	46,743	...	.....
Prairie Provinces	..	.....	2	1,704	...	.....	2	1,704	...	.....
British Columbia and Yukon	..	.....	3	3,056	1	2,854	3	3,056	...	.....
Costa Rica	1	500	2	2,424	...	.....	3	2,924	...	.....
Guatemala	..	.....	2	2,600	...	.....	2	2,600	...	.....
Honduras	..	.....	...	.....	1	3,800	1	3,800	...	.....
Panama	6	2,597	...	.....	...	.....	6	2,597	...	.....
Salvator	..	.....	1	3,220	...	.....	1	3,220	...	.....
Mexico	55	22,545	18	28,738	2	7,059	75	58,342	5	3,300
Jamaica	3	1,286	...	.....	...	.....	3	1,286	...	.....
Trinidad and Tobago	12	5,097	1	1,530	...	.....	13	6,627	...	.....
Other British West Indies	..	.....	1	1,700	...	.....	1	1,700	1	441
Cuba	4	1,423	1	500	2	6,960	7	8,883	...	.....
Dutch West Indies	2	861	...	.....	...	.....	2	861	...	.....
Argentina	..	.....	1	1,500	...	.....	1	1,500	...	.....
Colombia	2	710	1	934	1	5,700	4	7,344	1	575
Uruguay	10	2,654	...	.....	1	4,805	11	7,459	...	.....
British India	2	2,198	25	28,547	...	.....	27	30,745	...	.....
China	..	.....	2	5,115	1	1,516	3	6,631	2	1,603
Chosen	..	.....	...	.....	...	.....	...	.....	10	22,680
Japan	51	24,788	11	32,887	...	.....	62	57,675	1	3,776
Palestine and Syria	1	515	2	2,226	...	.....	3	2,741	...	.....
Siam	1	1,400	...	.....	...	.....	1	1,400	...	.....
Australia	12	15,078	92	121,205	5	8,017	109	141,300	...	.....
New Zealand	..	.....	3	5,310	1	3,000	4	8,310	...	.....
British West Indies	5	2,123	1	1,680	...	.....	6	3,803	...	.....
Canary Islands	2	2,868	...	.....	...	.....	2	2,868	...	.....
Egypt	7	3,060	...	.....	...	.....	7	3,060	...	.....
Totals	222	$114,067	220	$287,531	22	$59,595	464	$461,193	26	$41,125

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Smith Wheels hold their supremacy, now as before. They were in the front ranks of war in ever increasing numbers. This gave them a perfect score. In peace their results are the same.

Smith Wheels have always been of the same design, manner of making, and material used. Why? Because their performance could not be bettered.

Today there are more Smith Wheels made and sold than all other makes of metal truck wheels combined. They dominate the highways.

Although superior in appearance and quality to all others, and although their price is now less than their pre-war price, their performance, and nothing else, is what sells them.

The Rigid Type and Cushion Type of Smith Wheels vanquished all comers. Each performs perfectly its duties in their respective fields. The Cushion Type rides like a pneumatic.

If dealer, write us for Agent's proposition.
If Truck user, write for particulars.
Truck Maker knows.

SMITH WHEEL
SYRACUSE N.Y. U.S.A.

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Correspondence

General Correspondence, Criticisms, Suggestions, and Discussions Concerning Any Subject of Interest to Those Who Design, Manufacture, Sell or Use Commercial Motor Vehicles, Their Parts or Accessory Equipment, Are Solicited

Selling Transportation

To the Editor.—The editorial on "Time to Clean House" in your March issue raises some very pertinent features of the situation confronting the motor truck industry to-day. In attempting to offset this situation the position of the customer should be studied, for it is he who supports the industry. It is a difficult matter for the industry to rid itself of unsound concerns for even if this were possible by drastic means, it would look like persecution, and the reaction very apt to be unfavorable. The truck user, however, can help himself if he is shown how.

Of late, more than one writer has deplored the fact that trucks are not produced in sufficient quantities to be manufactured at the moderate prices for which passenger-cars are sold; but a multitude of salesmen suffused with "the great possibilities of the motor truck game" has gone out, each to sell his particular small trade on comparatively unessential details of his particular truck. If he can not represent a well-established concern, he will hook up with a "fly-by-night"; or he will encourage the organization of a new concern which will throw together axles, engines, transmissions, steering-gears, etc., to compose what he is pleased to call "one of the best trucks on wheels."

As you have pointed out, many of these truck manufacturing concerns are irresponsible, financially unsound, lacking in engineering and business ability—mere "mechanical tinkers." Truly, their product (and their organizations) should be "on skids" not wheels, but even a general acknowledgment of this by the motor truck industry does not help the situation, which may be worse before it is better.

There is much reason to believe that the wide diversification of details exemplified by nearly 500 truck models built by 278 concerns lies in the fact that a very large percentage of truck salesmen sell details and not transportation. The buyer is seldom able to judge the real value of any of the detailed why's and wherefore's of a motor truck. Strange to say, however, in innumerable cases he believes he is quite competent. Even if it is his first truck purchase, he has owned a passenger-car and likely has some very pronounced ideas as to why his car is the best, or how it excels certain others. If he has previously owned trucks he is even more positive as to what he prefers and dislikes. While the position taken by the purchaser may be justified in view of his experience, the chances are he has based his decision on only a part of the evidence and does not realize the compromises which must be made in all machine design.

Truck salesmen and dealers are quick to sense small prejudices, and they take advantage by playing upon some discovered like or dislike of the purchaser. Data are often submitted which, being only part of the truth, are misleading. Few truck buyers have the slightest chance of checking up data or arguments. Lack of correct information as to what a buyer should insist upon in his purchases has made a scattered market, cutting down the sales of a more desirable product and spreading them, by means of local sales acquaintance, over a large number of less responsible concerns. It has resulted in the disappointment of many buyers over the failure of their trucks to show the operating advantages which were expected.

The buyer can not purchase to good advantage unless he is able to visualize the main factors which enter into the problems of designing, manufacturing and operating motor trucks, and he must be able to talk the manufacturer's language in order to come to a proper understanding with him. He can then not only call for certain performance, but can possibly suggest from his own hard-earned experience better means of attaining this performance. His practical experience will focus manufacturing on fewer models, and by the fewer concerns which show themselves ready to meet the conditions. In the long run this means a larger volume of truck orders divided among fewer models; hence, quantity production.

The truck user must begin to get his knowledge, and use it, if he wishes to obtain his truck at the lowest price consistent with good service. The varying views of truck manufacturers and their organizations tend to diversify and multiply models. The user can focus his demand toward a more standardized vehicle which inherently can be built and serviced more cheaply.

Operating conditions do not vary so widely but that a moderate number of sound designs will fill them. The practical experience of truck operators qualifies them to dictate what shall be built, if they can do it with due consideration to the problems of design and manufacture. If this is done, the small irresponsible concern is bound to fall by the wayside in favor of the more sound and better managed concerns which will meet the demand cheaply and on a much better production schedule. The sooner buyers gain this essential knowledge, the sooner will the motor truck become a cheap and indispensable article of commerce universally used, rather than the variegated specialty of the present moment.

CORNELUS T. MYERS.

Rahway, N. J.

Parts for Torbensen Axles

With the idea of obtaining a national distribution for Torbensen service parts the Torbensen Axle Company is establishing a chain of parts service stations. In explaining this method of parts distribution R. C. Enos, vice-president and general manager of the company, said: "Each main service station will have a complete line of Torbensen axle parts for all models and will be centrally located, so that parts can be sent to any point in its territory with not more than 24 hours' delay."

Applications for parts service station representation are now being considered and it is expected to have the entire distributing organization completed within the next 60 days.

Davis Leaves Pierce-Arrow

Francis W. Davis, for several years consulting truck engineer of the Pierce-Arrow Motor Car Company, has resigned as of April 1. He has made no announcement respecting his plans for the future beyond intimating that he may enter the field of special engineering. Mr. Davis has been with Pierce-Arrow for 12 years in various capacities, and has done important work outside as a member of the Truck Division of the Standards Committee of the Society of Automotive Engineers, of the Truck Standards Committee of the National Automobile Chamber of Commerce, of the Permanent Committee of the Washington Highway Transportation Conference, and as chairman of the Committee on the Science of Truck Operation of the S. A. E.

Trucks in Czecho-Slovakia

The Ministry of Posts and Telegraphs of Czecho-Slovakia has received 300 applications for the establishment of state motor routes in all parts of the Republic. When the orders placed in 1921 have been delivered, the Ministry will have 112 motor omnibuses, 21 motor lorries, and 20 motor transport vehicles.

Sutton Goes with Signal

M. B. Hoagland, president of the Signal Truck Corporation, Detroit, has appointed Earle T. Sutton to the factory staff. Mr. Sutton was formerly advertising manager of the Denby Motor Truck Company, and prior to that appointment had extensive sales experience, both wholesale and retail.

Receivers for Ward La France

Receivers have been appointed for the Ward La France Truck Company of Elmira, New York, on the application of Leslie L. Zeet of Pittsburgh. The company claims assets of $280,000 and liabilities of $180,000, and the prospects of paying off the creditors are good, say the receivers.

Kelsey Profits Lower

Net profits of the Kelsey Wheel Company for 1921 were $1,792,861 out of a gross volume of business amounting to $17,487,597. This compares with $1,916,008 net from a turnover of $25,200,913 in the year previous.

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Mack TRUCKS

Capacities:
1½ to 7½ tons.
Tractors
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HOWEVER successful you may be as a salesman, the merits of the truck you choose to handle will mean everything to you in the long run.

Most men demand a product about which there is really something to say, a product with an unassailable record behind it, backed by an organization that lives up to the spirit as well as to the letter of its word.

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Schedule for Haulage Costs

The Ward Motor Vehicle Company, Mt. Vernon, New York, has devised a system of cost recording that has proved of value in showing up the wastefulness of horse haulage and the economy of the motor method. A thorough analysis of the complete haulage system is necessary to a proper understanding of what equipment is needed or advisable in the opinion of the company and, therefore, all forms of modern transport—horses, gasolene trucks and electric trucks—are included.

The appended schedule will be found interesting to many horse owners who will discover items of expense in connection with horse application that are not ordinarily accounted for yet prove horse haulage to be more costly than it has been believed to be. Many of the items properly chargeable to horse operation are neglected or dismissd as of no consequence. It is because horse cost-keeping has been generally conducted on this "hit-or-miss" plan that a demonstration of motor economy has often been so difficult.

One item in the schedule, that of depreciation of horses and trucks, may occasion some doubt. Many horses in urban service give more than an average of five years' service, which forms the basis of the 20 per cent. depreciation charge given, and few well cared for gasolene trucks of good design exhaust themselves in from three to five years' time as the estimated depreciation rate of 20 to 33⅓ per cent. would indicate. A more liberal and proper allowance would be from 10 to 15 per cent. in the case of horses and from 15 to 25 per cent. in the case of gasolene trucks. The depreciation rate for electric machines might be reduced to a basis of from 8 to 10 per cent. instead of the flat 10 per cent. set up.

New Gas Rail Car

The California Car Company with offices in Oakland is now perfecting the final plans for a light gasolene-propelled, railroad car. Many experiments have been tried along this line, especially by automotive factories for use near their plants. The California Car Company has a car carrying 40 people, weighing only 24,000 pounds, and operating for 12 cents a mile. It is equipped with a 40-horse-power Buda motor, and capable of running 35 miles an hour. In contrast to the old style of having the motor over the rear trucks, the California car has the motor attached to the front truck. The controls are the same as on a motor truck with the exception of a steering wheel and air-brake equipment.

British India has 2,660 motor trucks of all kinds, according to the latest census. Considered by provinces they are distributed as follows: Bengal Presidency 495; Central Provinces (Nagpur) 15; Karachi (Sind) 76; United Provinces (Allahabad) 347; Madras City 33; Madras Presidency (except Madras City) 298; Delhi 88; Burma 245; Northwest Frontier Province (Peshawar) 21; Bihar and Orissa 77; Bombay 544; Punjab (Lahore) 391; and Assam 30. There are no trucks in Ajmere-Merwara.

INVESTMENT IN DELIVERY EQUIPMENT, BUILDINGS, LAND, ETC.

Horse and Wagon.		Gas Truck.		Electric Truck.	
1. Cost of:		1. Cost of:		1. Cost of:	
..Horses at...		..Chassis at...		..Chassis at ..	
..Wagons at..		..Bodies at....		..Bodies at....	
..Sets of harness at		2. Cost of Land for Garage		2. Cost of Land for Garage	
2. Cost of Land for Stable		3. Cost of Garage.		3. Cost of Garage.	
3. Cost of Stable..		4. Cost of Equipment:		4. Cost of Equipment:	
4. Cost of Equipment:		Garage alterations		Garage alterations	
Stable alterations		Tools		Charging apparatus	
Tools		Parts		Wiring	
Parts		Cleaning equipment		Tools	
Cleaning equipment		Total Investment		Parts	
Total Investment				Cleaning equipment	
				Total Investment	

YEARLY COST OF OPERATION.

Horse and Wagon.		Gas Truck.		Electric Truck.	
1. Feed or Rental (per year):		1. Fuel or Rental (per year):		1. Energy (per year):	
Hay		Gasolene		Current	
Oats		Oil		Distilled water	
Corn		Or truck rental charge		Solutions	
Bran		Total		Total	
Salt		2. Lubrication (per year):		2. Lubrication (per year):	
Water		Oil		Oil	
Or horse rental		Grease		Grease	
Total		Total		Total	
2. Lubrication (per year):		3. Cleaning Items (per year):		3. Cleaning Items (per year):	
Axle grease..		Soap		Soap	
Total		Kerosene		Water	
3. Cleaning Items (per year):		Water		Rags	
Soap		Rags		Sponges	
Water		Sponges		Total	
Rags		Total		4. Other Expenses (per year):	
Sponges		4. Other Expenses (per year):		5. Repairs and Upkeep (per year):	
Harness oil..		Radiator mixture		Chassis	
Total		Kerosene for lamps		Body	
4. Other Expenses (per year):		Total		Battery	
Bedding (straw)		5. Repairs and Upkeep (per year):		Tires	
Kerosene for wagon lamps.		Chassis		Parts	
Total		Body		To buildings..	
5. Repairs and Upkeep (per year):		Tires		Or garage rental	
Wagons		Parts		Total	
Or wagon rental..		To building...		6. Interest on Investment (per year):	
Harness		Or garage rental		(Figure 3% on total investment.)	
Shoeing		Total		Buildings	
Veterinary		6. Interest on Investment (per year):		Land	
To buildings...		(Figure 3% on total investment.)		Vehicles	
Or stable rental		Buildings		Equipment	
Total		Land		Total	
6. Interest on Investment (per year):		Vehicles		7. Depreciation (per year):	
(Figure 3% on total investment.)		Equipment		Garage at 5%	
Buildings		Total		Vehicles at 10%	
Land		7. Depreciation (per year):		Equipment at 5%	
Horses		Garage at 5%.		Total	
Wagons		Vehicles at 20 to 33⅓%.		8. Insurance (per year):	
Equipment		Equipment at 10%		Buildings, vehicles and equipment	
Total		Total		Fire	
7. Depreciation (per year):		8. Insurance (per year):		Liability	
Stable at 5%..		Buildings, vehicles and equipment		Theft	
Horses at 20%		Fire		Total	
Wagons at 10%		Liability		9. Taxes (per year):	
Harness at 20%		Theft		Land	
Equipment at 10%		Total		Buildings	
Total		9. Taxes (per year):		Total	
8. Insurance (per year):		Land		10. License (per year)	
Buildings, horse and wagon and equipment		Buildings		11. Miscellaneous Charges:	
Fire		Total		Salaries of drivers	
Liability		10. License (per year)		Salaries of garagemen	
Theft		11. Miscellaneous Charges:		Painting	
Total		Salaries of drivers		Total	
9. Taxes (per year):		Salaries of garagemen		Grand Total	
Land		Painting		Multiply by	10
Buildings		Total		Ten-year cost	
Total		Grand Total			
10. License (per year)		Multiply by	10		
11. Miscellaneous Charges:		Ten-year cost			
Salaries of drivers					
Salaries of stablemen					
Painting					
Total					
Grand Total					
Multiply by	10				
Ten-year cost					

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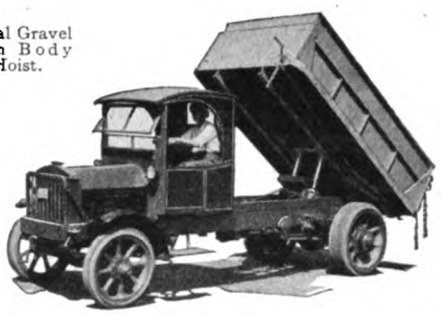

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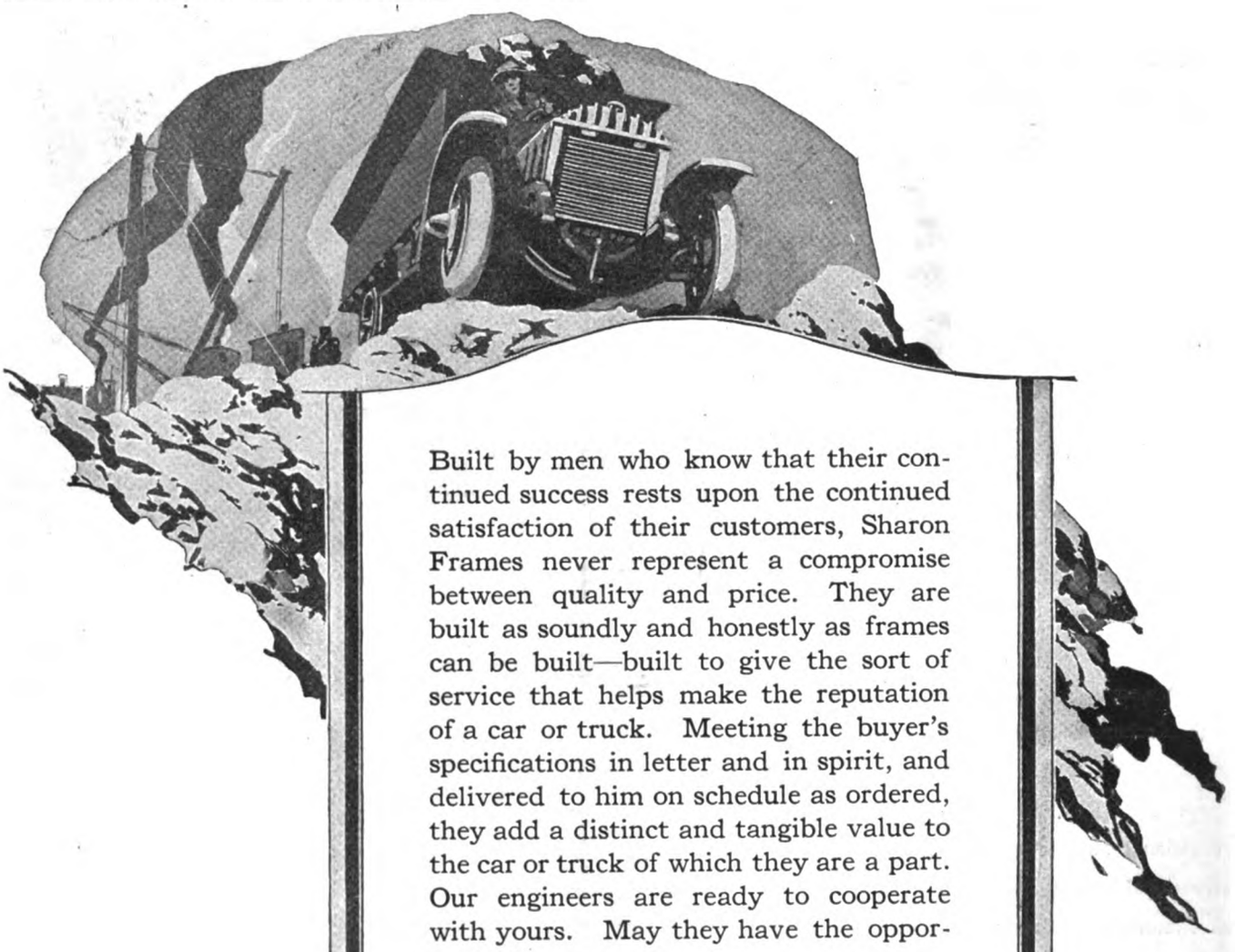

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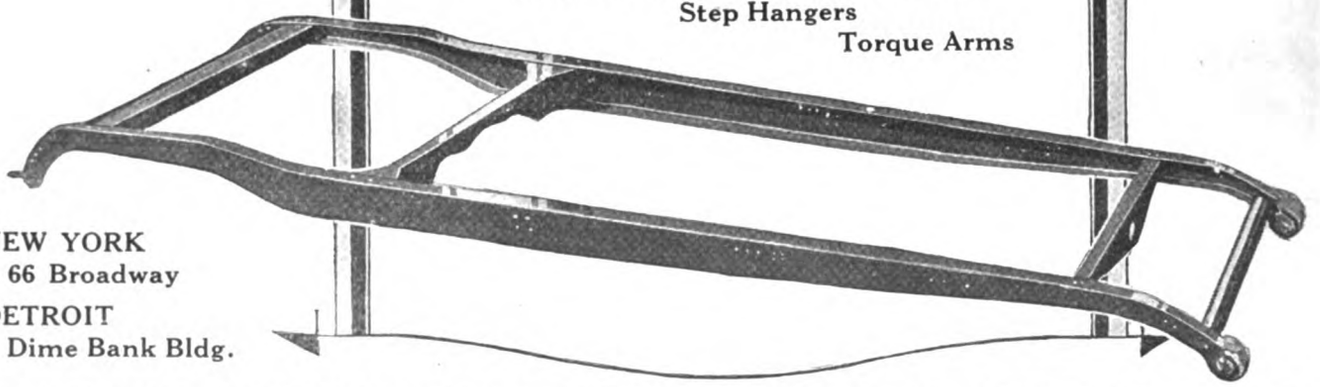

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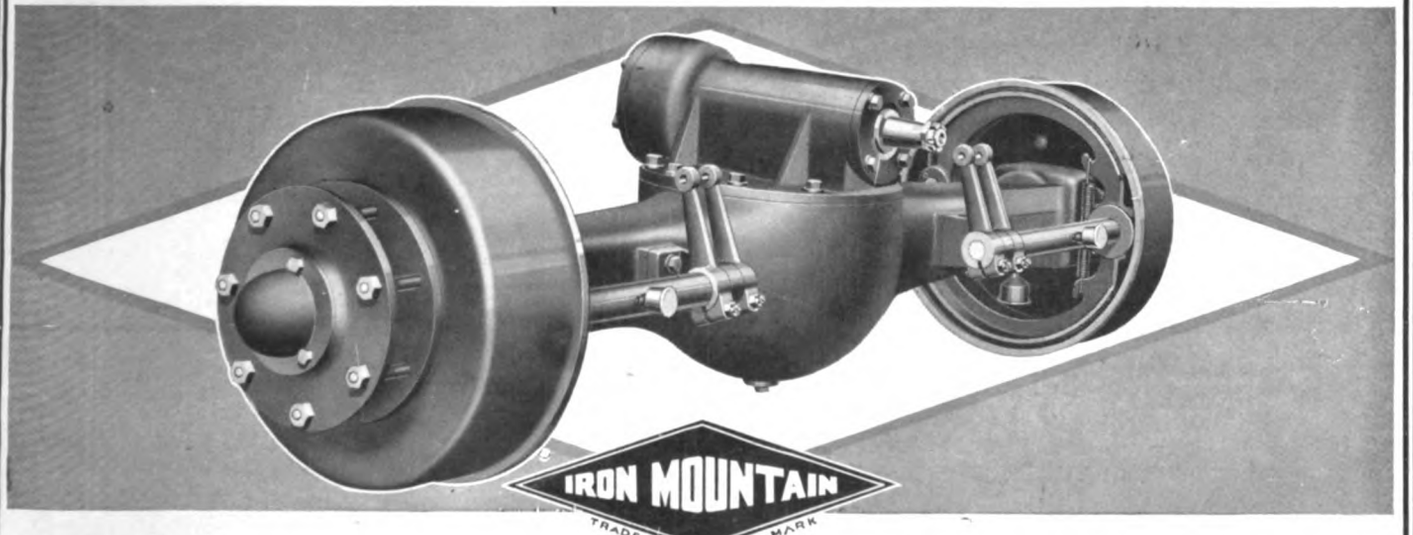

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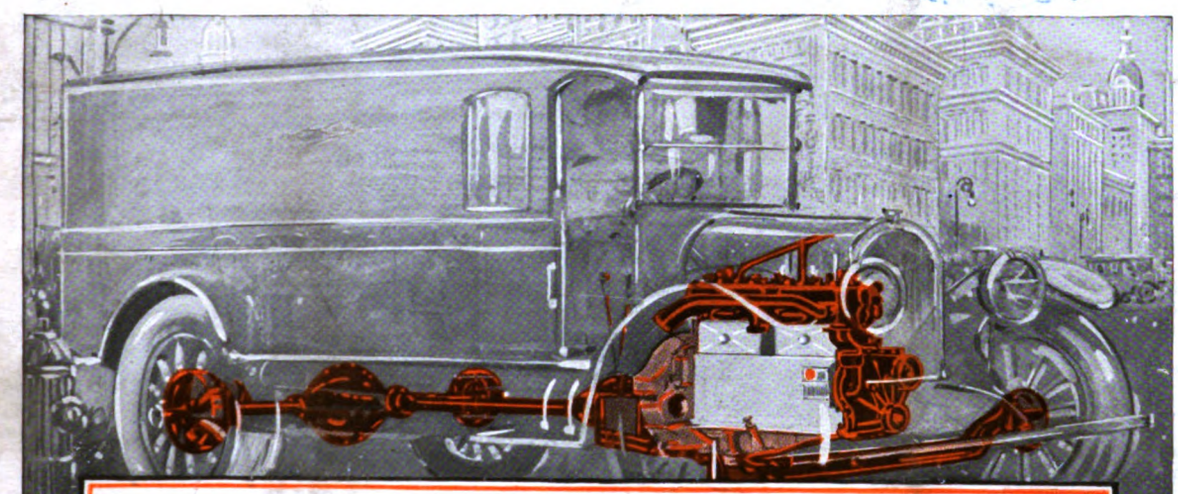

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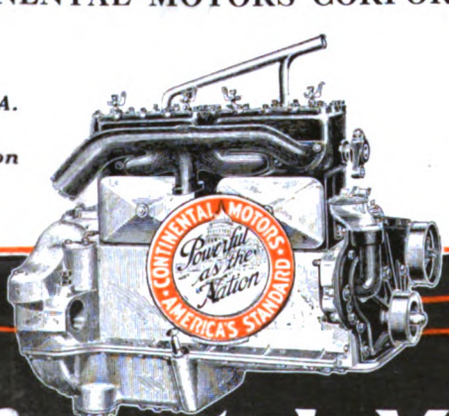

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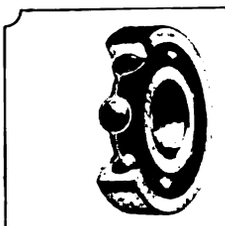

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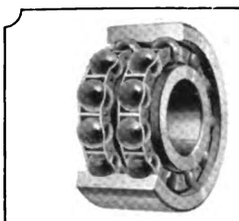

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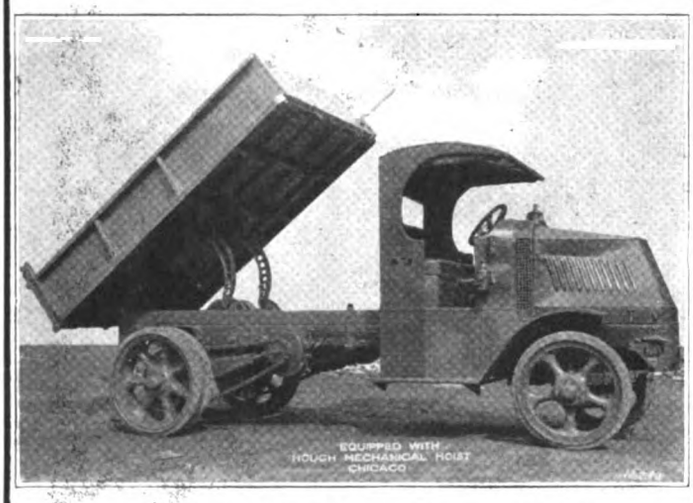

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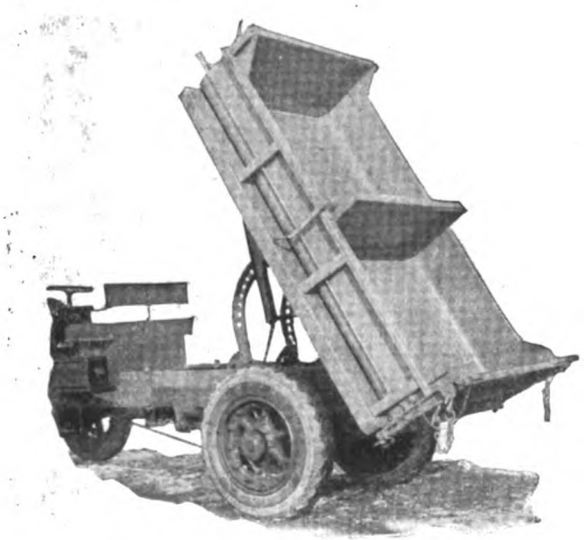

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THE POWER WAGON PUBLISHING COMPANY

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POWER WAGON

Vol. XXVIII. CHICAGO, MAY, 1922. No. 210.

Motor Vehicle Registration Reached 10,448,632 in 1921

7-YEAR RATE OF GROWTH MAINTAINED

With returns received from all states, the Bureau of Public Roads of the United States Department of Agriculture reports that the motor vehicle registration for the year 1921 totalled 10,448,632. This represents an increase of more than a million over the 1920 figures, or a number equal to the total number at the beginning of 1913.

The greatest increases in registration were in industrial sections, the agricultural sections in general showing a smaller amount of increase. No state reported a registration less than the 1920 figures. The total amount collected as fees of various kinds amounted to $122,478,654.

It has been expected that the registrations this year would show a greater falling off in the rate of increase than the figures reported show. The increase this year continues approximately the same average rate that has been maintained for the last seven years and shows no indication of the near approach of a condition of saturation in the supply of motor vehicles.

With more than ten million vehicles in use and the owners demanding improved roads over which to operate them, the question arises as to how long the country will have to wait for a connected system of highways covering the whole United States, say officials of the bureau.

The recent Federal Highway Act provided for the construction of a connected system of highways consisting of not more than 7 per cent. of the roads in each state and made an initial appropriation of $75,000,000 to be used in conjunction with state funds. The system to be built is now being outlined and it will comprise about 180,000 miles of road included in which there will be about 60,000 miles that are already completed.

With an annual program based on a federal appropriation of $75,000,000 and assuming that the states will continue to match the federal funds in the same ratio as heretofore and that the average costs of the roads built will be $20,000 a mile, officials say it will take 15 years to complete the proposed system. If the federal appropriations are made at the rate of $100,000,000 a year the system can be completed in 10 years, and if only $50,000,000 is appropriated annually it will take 20 years to build it. The question is how long can we wait.

Truck Production Rising Still

According to figures published in these columns last month, motor truck production during February reached 12,898, showing an increase of 40.7 per cent. over January, which itself showed an increase of 10.3 per cent. over December. During the same month passenger-car production reached the 109,005 as compared with 81,614 in January. During the first two months of this year, therefore, truck production amounted to 22,060 machines and car production to 190,619 machines.

Taking 1913 average monthly truck production as a base at 100, that of 1920 stood at 1,371 and that of last year at 617. The poorest month of last year was 424, January, 1921, stood at 469 and February at 659.

Taking 1919 average monthly truck production as a base at 100, that of 1920 was 102 and that of 1921 was 46. The poorest month since July 1, 1921, was 32 and the best month 52. January of this year stood at 35 and February at 79.

Ford 3-Tonner Coming

The Ford Motor Company will begin late in the summer to supply its 1-ton truck, equipped with body complete, as well as the stripped chassis. The design of the body has not yet been definitely determined, but it will be a combination type practical for several uses. "Three-in-one" is the way one factory official described it.

It is probable Ford will enter the 3-ton truck field late in the summer. This is dependent largely upon the development of business generally up to that time and the consequent probable demand for trucks. The company has mapped out definite plans to go into the heavy truck field, but they have been delayed temporarily.

65 Reo Trucks a Day

Sixty-five of its new delivery trucks a day is the present production figure announced this week by the Reo Motor Car Company. In addition, passenger-car business is reported as about normal. Net earnings during the first quarter of the year were at the annual rate of $6,000,000, it is declared.

19,422 Trucks Made in March

Truck production in March reached 19,422, an increase of 6,524 or 50.2 per cent. over February figures, 12,944. This is the largest month's output in the last nine months and, probably, within a year. The increase in truck production has been steady since December when the low point of 8,305 was touched. The figures for February given above represent a revision over those published in the article at the top of this column.

Pierce-Arrow and Lafayette Joined in New Combination

CLIFTON AND NASH TO BE AT HEAD

The directorates of the Pierce-Arrow Motor Car Company and the Lafayette Motors Company have agreed in principle upon a merger of the two companies, and C. W. Nash, president of Lafayette, is to become active head of the consolidation, as chairman of the board. Colonel Charles Clifton, chairman of Pierce-Arrow, is to become president. A new company will be formed to absorb the two concerns.

Complete details of the arrangement are being worked out by participating interests and probably will be ready soon. Under the plan the J. & W. Seligman interests, who have been active in Pierce-Arrow affairs, will join Lee, Higginson & Company, the Lafayette backers, in working out the merger.

Aside from the value to Pierce-Arrow of C. W. Nash's experience and ability as a motor manufacturing executive, the consolidation will make possible the utilization of Pierce-Arrow's excessive manufacturing facilities to turn out bodies for both Lafayette and Pierce-Arrow cars. Lafayette has been experiencing difficulty in securing satisfactory bodies for the high-grade chassis which it manufactures and contemplated the erection of its own body plant. Mr. Nash believes that the Pierce-Arrow plant turns out the best passenger-car bodies available, and since its capacity is far greater than Pierce-Arrow would be likely to have use for alone, it was thought that a consolidation would solve Lafayette's body problem and help Pierce-Arrow to an equal extent by absorbing idle facilities.

In addition to an exchange of stock the consolidated company probably will issue $10,000,000 or $12,000,000 notes or bonds, proceeds of which will be used to pay off Pierce-Arrow bank loans of approximately $8,000,000, retire a small bank debt of the Lafayette company and provide working capital. Pierce-Arrow's capitalization comprises $10,000,000 8 per cent. preferred stock and 250,000 shares of no par value common. There is no funded debt. Lafayette Motors Company has outstanding $4,000,000 7 per cent. preferred and 40,000 shares of no par common. It also has no funded debt.

Following a small loss from operations in January and February Pierce-Arrow showed a profit in March. For the first quarter operating income was $290,074,

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New Truck Organization Is Ready for Large Program

WORK WILL BE DEPARTMENTALIZED

At the first meeting of the Board of Directors of the recently organized National Association Motor Truck Industries, M. L. Pulcher, vice-president and general manager of the Federal Motor Truck Company, Detroit, was elected president and will lead the new organization during its first year. H. T. Boulden, vice-president of the Selden Truck Corporation, Rochester, New York, and formerly president of the National Association of Motor Truck Sales Managers, was elected first vice-president; B. A. Gramm, vice-president of the Gramm Motor Truck Company, Lima, Ohio, and formerly president of the Motor Truck Manufacturers' Association, second vice-president; Moie Cook, secretary of the Service Motor Truck Company, Wabash, Indiana, secretary; and A. S. More, president of the Denby Motor Truck Company, Detroit, treasurer. F. G. Elder, vice-president of the Day-Elder Motors Corporation, Newark, New Jersey; J. W. Stephenson, vice-president of the Indiana Truck Corporation, Marion, Indiana; Homer Hilton, vice-president of Winther Motors, Inc., Kenosha, Wisconsin, and J. E. Tracy, vice-president of the Parker Motor Truck Company, Milwaukee, Wisconsin, with the officers named above, comprise the directorate.

The first directors' meeting was held in Detroit on March 21 and, in addition to a liberal attendance of truck manufacturing members, many representatives of the leading motor truck parts manufacturing organizations, which are also affiliated with the new association, were present and assisted in outlining a program of activities which promise much in the way of stabilizing conditions in the industry.

The new organization bands together for the first time all the groups interested in the welfare of the industry, which groups heretofore have worked separately toward the same ends with more or less unsatisfactory results. Each group will have its separate division, conducting its own deliberations, but contact between groups will be maintained through the headquarters office of the association, which is located in Detroit at 1156-57 Book Building. Don F. Whittaker, formerly general manager of the National Association of Motor Truck Sales Managers, will be in active charge of the new association's affairs.

Divisions already established are: Parts Manufacturers, Motor Truck Manufacturers, Sales, and Service. Dealers' and Users' divisions are also contemplated. When the organization is completed in its entirety, from the manufacturer of the raw material to the method of operating the finished product in the hands of the user, the motor truck will be constantly the subject of consideration on the part of members in the various divisions, who will seek to improve, perfect and generally to make the manufacture, sale and use more profitable.

The National Association of Motor Truck Industries has attracted to membership many of the successful motor truck manufacturers in the United States and practically all the leading manufacturers of specialized units and parts.

When the new association was formed, the Motor Truck Manufacturers' Association and the National Association of Motor Truck Sales Managers, both of which had been in successful existence for a period of approximately five years, decided to disband to avoid duplication of effort. The most successful features and services of both have been incorporated in the new association's activities.

The National Association Motor Truck Industries is the only association exclusively devoted to the interests of the truck industry and as such intends constantly to strive toward better conditions and the advancement of the motor truck in the field of transportation. It is the policy of the association, however, to coöperate to the fullest extent with all other recognized associations in the automotive industry lending its support and coöperation in all matters of common interest.

Recognizing the need for better distributing methods throughout the industry, the officers of the association consider this one of its most important objectives. Through a far-reaching and thorough study of those conditions which have been responsible for too high a rate of dealer mortality, it is proposed to chart a course which the new dealer organizations can follow with an assurance of success. The dealer will be schooled in the most successful, proved methods of conducting his business, as well as warned against the mistakes and errors which have proved pitfalls for the dealers who have fallen by the wayside during the past few years.

The fundamental importance of providing more efficient service in the field has been recognized by the adoption of plans to bring about a closer coöperation between manufacturers, dealers and users to make present facilities meet the needs of the user, in a better and more economical manner.

The used truck problem has also come in for its share of consideration, having such an important bearing upon the success or failure of the dealer fraternity. It is common knowledge that a very high percentage of failures is directly traceable to the fact that many dealers have tied up practically all their working capital in used trucks traded in at values in many cases far in excess of their worth. Many sales in new trucks have been consummated on a basis where it might truthfully be said that the dealer bought a used truck rather than sold a new one. An effort will be made to determine a fair and equitable basis of valuation of used trucks after definite specified periods of operation or mileage, for the guidance and assistance of all dealers who wish to conduct their businesses on a business-like basis, trading in used trucks at reasonable values and selling new trucks in such a manner that the dealer may profitably maintain suitable sales and service facilities.

which after taxes and interest charges of $315,300 resulted in a deficit of $25,226. Passenger-car sales continue in good volume and in the truck division improvement is even more marked. Thus far in 1922 truck shipments have been approximately twice those of the corresponding period of last year.

Baltimore Transit Line Orders 26 Motor 'Buses

RESULT OF NINE MONTHS' SERVICE TEST

"The order for 26 Republic Knight-motored 'buses recently placed with us by the Baltimore Transit Company, forecasts the rapid development of motor 'buses for supplementary and feeder service for existing railway lines," said Col. Frank E. Smith, president of the Republic Truck Sales Corporation.

The Baltimore Transit Company, a subsidiary of the United States Railways & Electric Company, has been operating a large number of motor 'buses for a period of over five years. It was recently required to expand its service, and also to replace a number of the old units.

In October, 1921, a Republic Knight-motored 'bus was put in to test operation over the Charles Street route, and during a period of five months was subjected to a passenger loading and mileage equivalent to nine months of actual operation.

The average mileage per gallon of gasolene during the entire five months of the test was 8.6, and during the last thirty days of operation, this increased to 9.3 miles per gallon. The complete 'bus was disassembled at the end of the test period and found to be in perfect condition mechanically, after operating more than 16,000 miles. The cost of repairs during the period was less than $25.00.

The sale of these 26 'buses to the Baltimore Transit Company is the outgrowth of activities initiated about one year ago, when the Republic Truck Sales Corporation became convinced of the latent possibilities of the motor 'bus for supplementary and feeder service to existing railways. A Public Utilities Division was created as part of the Republic organization, under the direction of Ralph M. Sparks, a passenger transportation expert of broad experience in the traction field. After extended study, which covered the principal cities of the United States and Canada, where 'buses were operated, Republic engineers designed a motor 'bus, based on the results of the investigation.

Rebuilt Autocar Prices

Adopting a practice which has been strongly advocated as a means for stabilizing the used-car market, the Autocar Company is advertising rebuilt and reconditioned chassis. For example, the 2-cylinder 1½-ton model, selling for $1,950 new, is listed at $1,650 rebuilt and from $1,100 to $1,400 reconditioned.

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New Truck Regulations Effective in New York

OVERLOADING PRACTICE IS HIT HARD

The New York Legislature passed the Lowman Bill, Senate Introductory No. 139, in the last days of the session. This bill is of tremendous importance to the motor truck operator as it reduces the allowable weight which can be carried on the rear axle of a truck, while increasing the gross load, and also regulates speed, size of bodies, requires the display of weights and capacities on the truck and greatly increases the penalties for violations of these provisions. The provision limiting the height of a motor truck is repealed.

The provisions of the bill are as follows:

The limit of gross weight on a 4-wheeled vehicle is raised from 25,000 to 28,000 pounds.

The carrying capacity of solid tires is reduced from 800 pounds per inch in width, measured at the base, to 700 pounds, and the wheel load is now limited to 9,800 pounds.

The width of pneumatic tires is to be measured at the greatest width of the casing.

There is a new provision prohibiting the use of a solid tire which is worn to less than one inch above the metal flange on the tire.

All motor trucks and 'buses must now have a rear-vision mirror.

The weights and capacities of motor trucks must be displayed on the right side of the body or chassis or on the right side of the cab below the driver's seat in the following form:

Weight of vehicle.....pounds
Manufacturer's rated capacity.....pounds
Gross weight .....pounds

—the weight being inserted in each case. This can be done either by painting the information on the truck or by affixing a metal plate containing the information. If the metal plate is used the size of the letters and figures shall not be less than a half inch high, and, if painted, not less than one inch.

Trucks must not be loaded beyond the manufacturer's rated capacity.

The penalties for overloading are very heavy, and include the power to compel unloading of the excess weight by the roadside.

For the first offense $50.00 is the limit for the fine and 30 days the maximum jail sentence. For the second offense the minimum fine is $50.00 and the maximum $100.00 with a jail limit of 60 days. For the third offense the minimum fine is $100.00 and the maximum $250.00 and the jail sentence 120 days. In addition to these penalties it is mandatory for the third offense that the registration of the motor truck be suspended for not less than 30 days nor more than six months.

The law also reads: "In each case of overloading found, the amount of the overload in excess of 5 per centum of the allowable load shall be unloaded on the side of the road or at the place where the vehicle was weighed."

There is also a maximum $25 fine for not having the signs on the trucks, their not being legible, or for having inaccurate statements contained therein.

Speeds are also covered in this bill. Under the old law motor trucks had no specific speed regulations and were under the same restrictions as passenger-cars. The provisions in this bill limit the speed of trucks of 2-ton capacity and under to 20 miles an hour, and of trucks of over 2 tons' capacity to 15 miles per hour when equipped with solid tires. The speed limits are increased 5 miles per hour in the case of trucks equipped with pneumatic tires.

Sees Good Truck Business

"In the past sixty days our truck business has shown decided activity," says C. B. Voorhis, vice-president and director of sales of the Nash Motors Company. "Dealers in practically all sections of the country are ordering trucks in greater numbers than at any time during the past eighteen months. This activity is not confined to any one or two sections but is pretty general throughout the country.

"The improvement in business has been slow, to be sure, but there is an improvement on a very sound basis with the result that the dealer who represents a line of trucks of sound value and built by a manufacturer of unquestioned stability is now beginning to feel a renewed demand for his trucks.

"While I believe 1922 will be a good truck year, I feel equally certain that the motor truck buyer will be far more conservative than formerly in the matter of motor truck selection. He will insist upon knowing all that is to be known regarding the truck under consideration. In his mind will be the question, 'Who is back of this truck? Has the manufacturer whose name it bears the right to be a maker of motor trucks? What of his financial standing; his ability to build trucks at a price that is fair and sound? How long will this truck maker be in business?'

"These questions are only the natural result of events that have transpired in the past two years and careful buying of motor truck equipment is right in step with the times, for purchasing in all lines is returning to normal with the buyer assuring himself beyond reasonable doubt as to sound value before his order is placed."

Detroit 'Bus Project Sleeps

The Detroit Department of Street Railways has given up the idea of using either "trackless trolleys" or gasolene 'buses on the city-owned railway lines, because of the prohibitive fares it would have to charge. Assistant General Manager Schram says:

"'Buses are still in a stage of development and our tests to date show it costs 8.9 cents a passenger to handle 'bus traffic. A 10-cent fare could not be avoided. Eleven 'bus and motor manufacturers have conducted tests for us and the obstacles have not been overcome. The question of even the type of tire is serious. There is much snow here and tests show a pneumatic tire would be needed but its price is prohibitive."

Torbensen Axle Acquires Republic Truck Interest

COMPLETE REORGANIZATION EFFECTED

Cleveland interests, headed by J. O. Eaton, former president and general manager of the Torbensen Axle Company, have acquired the interest in that company formerly owned by the Republic Motor Truck Company and have reorganized the local concern. Coincident with this announcement comes the news that within the last two weeks orders with shipping specifications attached have been received which brings the monthly production to over $300,000.

Mr. Eaton and his associates, constituting substantially the same group of men who directed the company in the period of its greatest prosperity, announces that, in connection with the reorganization just completed, the company has been placed in very satisfactory financial condition. As reorganized, the company has only one class of security outstanding, 80,000 shares of common stock without par value, holders of the old preferred receiving four shares of the new common for each share of preferred. A block of the new common stock has been sold to provide necessary funds.

The Torbensen Axle Company was organized in a very small way in Newark, New Jersey, in 1911, and was moved to Cleveland in 1915. The production and sales figures show that in 1913 the company produced only 222 rear axles, while in 1920 its production totaled 21,795 rear axles and 9,952 front axles having a total sales value of $5,364,000.00.

The Torbensen Axle Company now manufactures each year about one-sixth of all truck axles sold in the United States exclusive of Ford. Among its principal customers are International Harvester Company, Olds Motor Works, Republic Motor Truck Company, Graham Brothers, Commerce Motor Car Company, Avery Company, Martin-Parry Company, Velie Motors Corporation and Cass Plow Company.

The company's business in replacements and parts alone is capable of operating the company's plant at approximately half capacity.

The company's balance sheet, after reorganization, shows fixed assets valued at $1,421,735, net current assets of $749,976, and total net assets exclusive of patents, of $2,257,815, or more than $25.15 per share The average annual earnings for the five years ending December 31, 1921, before federal taxes, amortization of patents and interest charges, but after depreciation, adjustment of inventory to market and loss on purchase commitments, were $451,564, or $5.64 per share of the new common stock. These figures include a write-down in inventory of $491,020 taken in 1920 and 1921. In 1921, despite adverse business conditions, the company made a small profit.

Registration figures for the first quarter of this year show 15,369 trucks, 200 trailers and 174,362 passenger-cars in the state of Nebraska.

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

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How the Unfit Survive

EVIDENCE is not lacking to confirm the assertions that have been made with respect to the remarkable power of revival inherent in every dying organism, and the present times afford striking proof of the truth that no concern, however much it may wheeze and totter, is definitely out of the field of competition until its shattered frame is finally laid to rest. So long as a flutter of the heart remains to indicate a lingering struggle for life, means can be found to revive and rehabilitate.

An interesting example in the truck manufacturing business appears in the case of a concern that has been adjudged bankrupt, having assets of around $400,000 and liabilities of about $600,000. There are claims for federal, state, county and city taxes unpaid, a first mortgage held by a local banker, another bank loan, the claim of labor for wages in arrears, and, finally, the miscellaneous claims of general creditors. The latter have been offered 15 per cent. for their claims and some seem inclined to take what may easily prove to be more than the results realized from a receiver's sale. At this juncture comes a former executive of the company, who makes a bid for the firm's assets and offers, toward their purchase, a cash payment of $5,000. The concern will then be reorganized with a capitalization of $1,000,000 (probably arrived at by taking the sum of the assets and liabilities), new stock will be issued in brilliant colors, the promoters and stock-sellers will bask in the sun of prosperity for a time, and the gullible will be "taken in."

This may be considered typical of what can be done with the remnant of a dying concern and, while generally we have little or no interest in such matters, we can not refrain from protesting against a proposal which must inevitably prove detrimental to the industry as a whole. The company referred to, like scores of others, has a distributing system of insignificant dimensions, its product has no novel or exceptionally meritorious features that warrant special attention, and its personnel—if one may judge from the methods that have brought it to its present condition—no particular genius for contributing to the improvement of the business at large or of achieving conspicuous individual success. Under the circumstances it would appear to be an act of mercy to allow the battered frame to expire in peace, saving for the creditors (ourselves among them) whatever may be left. We can see no earthly advantage (and we see innumerable disadvantages) in attempting to fan the spark of life in what is merely the shell of an organism suffering from numerous diseases other than financial impotency, and which, granting that its life can be extended, certainly must be driven to the adoption of every questionable trade practice in order to eke out even the most meager existence in competition with its stronger rivals and which must, in the very nature of things, continue to be a burden on the entire industry.

We have selected this example, not because it is a singularly horrible one, but because it illustrates the folly of hoping that commercial wreckage which represents the rag, tag and bobtail of manufacture will, through the pressure of financial stringency, necessarily disappear from the field. For every man who wishes and prays for the demise of such a waif there is at least one other who will studiously contrive ways and means for keeping it afloat. If the medical profession approves the refusal of succor to dying imbeciles on the ground of their ultimate inutility and danger to humanity, is there any good reason why industry should be reluctant to aid in the elimination of the commercially unfit?

Impressions of Instability

EVERY days's experience with the general publication of numerical data strengthens our conviction that professional statisticians are not to be trusted. Although they sometimes wilfully distort the truth in their desire to humor prejudice or conciliate special interests, we believe they are, on the whole, reasonably careful and honest. Their almost universal inability to understand and interpret figures makes it necessary for well-informed persons to be ever on the watch for half-statements and unintentional misrepresentation and makes their work particularly mischievous when it falls into the hands of the general public and the more or less analytical financiers.

A recent article in our esteemed contemporary, the *Wall Street Journal*, opens with the statement that "motor truck manufacturers in 1921 experienced one of the leanest years in the history of the industry," and proceeds to demonstrate that their business declined 55 per cent. as compared with the preceding year and that 1921 production was the lowest since 1917. In point of strict numerical accuracy no criticism will lie against these remarks, if we accept the writer's premise of a production for 1921 of 145,000 trucks, which, while exaggerated, does not touch the question. The statements as quoted are decidedly destructive of the best interests of the industry, since they carry no explanation of the large output of 1920 with which subsequent figures are compared, and leave the reader with the impression that the truck business is in a very bad condition. To this view we must take, and have already taken, most serious exception, on the very obvious ground that the truck business, in company with many others, has suffered from a very violent inflation, due

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to the war and its attendant and consequent conditions, and that, making allowances for that fact, the trade for last year was all that could reasonably have been expected.

We deem it particularly unfortunate that one of the leading financial journals of the country, regularly consulted by many men of means who are asked to be of assistance to individual members of the truck industry, can not provide its readers with a more truthful picture of the state of business in this trade. And it is still more regrettable that there is apparently no voice ready to challenge this form of misstatement and to demand the kind of explanatory comment that is due the solid fabric of the industry.

Motor Business Ahead of 1921

During the past three months motor vehicle production exceeded 390,000 cars and trucks, or 65 per cent. more than the same period last year, with every prospect of even greater increase in the next quarter, according to Alfred Reeves, general manager National Automobile Chamber of Commerce. Wire reports from forty different sections indicate that car and truck sales are on the upward trend, which indicates that this year's production will be substantially in excess of 1921.

"The extraordinary strong business which we are now enjoying," says Mr. Reeves, "comes first from the fact that many cars were held over last year that should have been replaced with new cars; that stocking and buying during winter was light; that demand for motor transportation continues pressing, and the fact that general business is constantly moving forward.

"Interviews with government officials at Washington show every prospect of easy money conditions for the remainder of the year; improving prices for farm products and a general upward turn of practically all lines of business. This latter has had a substantial effect on the truck business which probably will make proportionately bigger gains this year than passenger car production."

One of the important things which has contributed to the return of almost normal conditions in the motor industry is the fact that manufacturers promptly took losses during the period of readjustment, and priced their products on a basis comparable with the buying power of the country.

Reductions in Truck Prices

The following table contains a record of the changes in truck chassis prices since the 15th of last November, giving the old price, the new price, the amount of the reduction, and the date of the change:

Truck.	Old Price.	New Price.	Reduction.	Date of Change.
Acason, 1½-ton...	$2,485	$1,950	$535	3/ 4/22
Acason, 2½-ton...	3,295	2,750	545	do.
Acason, 3½-ton...	4,295	3,450	845	do.
Acason, 5-ton.....	5,250	4,350	900	do.
Autocar, 1½-ton..	2,300	1,950	350	1/ 3/22
Autocar, 3½-ton..	4,350	3,950	400	do.
Bethlehem, 1-ton.	1,895	995	900	2/ 4/22
Bethlehem, 2-ton.	2,725	1,495	1,230	do.
Bethlehem, 3-ton.	3,750	1,895	1,855	do.
Bethlehem, 3½-ton	4,195	1,995	2,200	do.
Commerce, 1½-ton	2,050	1,695	355	11/18/21
Corbitt, 1-ton.....	2,200	1,480	720	1/ 1/22
Corbitt, 1½-ton...	2,600	2,200	400	do.
Corbitt, 2-ton.....	3,150	2,600	550	do.
Corbitt, 2½-ton...	3,300	3,000	300	do.
Corbitt, 4-ton.....	4,100	3,800	300	do.
Corbitt, 5-ton.....	5,000	4,500	500	do.
Denby, ¾-ton.....	1,625	1,485	140	1/ 1/22
Denby, 1½-ton...	2,300	2,145	155	do.
Denby, 2-ton.....	2,600	2,395	205	do.
Denby, 4-ton.....	4,200	3,895	305	do.
Denby, 5-ton.....	4,850	4,295	555	do.
Denby, 7-ton.....	5,500	4,945	555	do.
Duplex, 3½-ton..	4,250	3,500	750	2/27/22
Ford, 1-ton.....	445	430	15	1/ 6/22
Garford, 1¼-ton..	2,040	1,990	50	11/19/22
Garford, 2-ton....	3,190	2,750	440	do.
Garford, 3½-ton..	4,390	3,750	640	do.
Garford, 5-ton....	5,200	4,500	700	do.
Garford, 7½-ton..	5,500	5,200	300	do.
GMC, 2-ton.....	3,000	2,775	225	1/ 1/22
GMC, 3½-ton.....	4,250	3,950	300	do.
GMC, 5-ton.....	4,650	4,350	300	do.
Gramm, 1½-ton..	2,050	1,900	150	1/16/22
Gramm, 2-ton....	3,175	2,925	250	do.
Gramm, 3½-ton..	4,375	4,225	150	do.
Gramm, 5-ton....	5,275	4,895	380	do.
Harvey, 2-ton....	2,950	2,650	300	1/30/22
Harvey, 2½-ton..	3,200	2,950	250	do.
Kearns, 1-ton....	1,600	1,150	450	3/ 6/22
Kearns, 2-ton....	2,200	1,650	550	do.
Menominee, 1¼-ton	2,080	2,000	80	1/26/22
Menominee, 1½-ton	2,725	2,475	250	do.
Menominee, 2-ton	3,245	2,875	370	do.
Menominee, 3½-ton	4,270	3,800	470	do.
Menominee, 5-ton	5,450	4,850	600	do.
Master, 1½-ton...	2,690	2,290	400	2/23/22
Master, 2½-ton (doub.)	3,540	3,190	350	do.
Master, 2½-ton (worm)	3,290	2,890	400	do.
Master, 3½-ton (doub).	4,640	4,290	350	do.
Master, 3½-ton (worm)	4,190	3,990	200	do.
Master, 5-ton (doub.)	5,440	5,090	350	do.
Master, 5-ton (worm)	5,290	4,990	300	do.
Maxwell, 1½-ton.	1,332	932	400	12/ 9/21
Packard, 2½-ton (EC)	3,500	3,100	400	2/16/22
Packard, 2½-ton (EX)	4,000	3,500	500	do.
Parker, 3½-ton...	4,400	3,950	450	4/17/22
Parker, 5-ton.....	5,500	4,850	650	do.
Selden, 1½-ton...	2,360	2,250	110	1/ 3/22
Selden, 2½-ton...	3,425	3,250	175	do.
Selden, 3½-ton...	4,175	3,750	425	do.
Selden, 5-ton.....	5,600	4,950	650	do.
Seneca, ½-ton....	920	820	100	4/17/22
Signal, 1-ton.....	2,475	1,950	525	11/15/21
Signal, 1½-ton...	2,925	2,450	475	do.
Signal, 2½-ton...	3,275	2,875	400	do.
Signal, 3½-ton...	4,275	3,675	600	do.
Signal, 5-ton.....	5,300	4,400	900	do.
Stewart, ¾-ton..	1,395	1,195	200	1/ 3/22
Stewart, 1-ton...	1,875	1,395	480	do.
Stewart, 1½-ton.	2,200	1,790	410	do.
Stewart, 2-ton...	2,800	2,090	710	do.
Stewart, 2½-ton.	2,950	2,290	660	do.
Stewart, 3½-ton.	3,850	3,090	760	do.
Stoughton, 1-ton.	1,995	1,790	205	3/20/22
Stoughton, 1½-ton	2,350	2,150	200	do.
Stoughton, 2-ton.	2,800	2,490	310	do.
Stoughton, 3-ton.	3,600	3,150	450	do.
Transport, 1-ton.	1,395	1,295	100	1/ 1/22
Transport, 1½-ton	1,995	1,495	500	do.
Transport, 3½-ton	3,885	2,585	1,300	do.
Veteran, 1½-ton..	3,500	2,699	801	1/30/22
Veteran, 2-ton....	4,000	3,699	301	do.
Veteran, 3-ton....	4,400	4,200	200	do.
Veteran, 4-ton....	5,600	5,395	205	do.
Walter, 5-ton.....	5,600	4,850	750	12/ 9/21
Ward, ½-ton.....	2,860	2,485	375	4/17/22
Ward, ¾-ton.....	3,850	3,295	555	do.
Ward La France, 2½-ton	3,590	2,990	600	2/20/22
Ward La France, 3½-ton	4,690	3,990	700	do.
Ward La France, 5-ton	5,590	4,590	1,000	do.
Wichita, 1-ton...	2,000	1,875	125	3/17/22
Wichita, 2-ton...	2,500	2,400	100	do.
Wichita, 3-ton...	3,500	3,200	300	do.
Wichita, 4-ton...	3,900	3,500	400	do.

International Ships 1,651 Carloads

An interesting side-light on business conditions in general, and particularly in the automotive field, is found in the figures shown by the International Harvester Company of America on the sale and delivery of International trucks this year. Up to April 1, a total of 1,651 carloads of trucks have been shipped from the factories at Akron and Springfield, Ohio, to be delivered to purchasers. Of the total, 892 carloads were shipped west of the Mississippi River and 759 carloads were for delivery east of the river. These carloads would make a single train 14 miles long or 33 average trainloads of 50 cars each. The freight charges approximate $247,000. If all these trucks were placed in service at one time they would be capable of moving the 12,000,000-bale cotton crop of the entire United States the usual average haul, in 20 working days. The mileage to accomplish this task would amount to 10,000,000 miles, a distance equal to 400 times around the earth at the equator.

In giving out these figures the sales department indicated that the satisfactory growth in truck business was partly due, at least, to the free inspection service which has been in force at the 92 company branch houses for over two years. Truck owners say that service is the "king-pin" in motor truck hauling and that the International 90-day inspection service is a real safeguard against hauling delays.

White Business Improves

White truck business continues to improve. The White Company reports March orders were approximately 20 per cent. higher than any month since May, 1920, and that deliveries exceeded any month since September, 1920. The first quarter's business, in both orders and deliveries, shows considerable increase over the corresponding quarter last year. Loans have been reduced since January 1 to $3,300,000, with over $2,500,000 cash on hand, in addition to the dividend payment of $500,000 on March 31.

Reports from the forty branches of the company indicate a decided improvement in general business conditions with every prospect for increasing business. The demand for motor trucks to operate on railroads continues. The company has had a number of such trucks in successful operation for more than five years. A few of the numerous railroads operating White trucks on rails are the LaCross & Southeastern Railroad Company, Minneapolis; Verde Tunnel & Smelter Railroad Company, Clarkdale, Arizona; Mt. Hood Railway, Hood River, Oregon; and the Tennessee Midland Railway, operating between Franklin and Mt. Pleasant, Tennessee.

Republic Sales Mounting

F. E. Smith, president of Republic Truck Company, states that both March and February sales showed an increase of 50 per cent. over the preceding month; April sales running at a rate of 50 per cent. improvement over March. The company recently closed a contract with the United Railway & Electric Company of Baltimore, for 26 'buses. This order was placed after a five months' test and a thorough investigation of 'bus operation in Europe and America.

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Business Fast Improving, Government Tells Chamber

MONEY RATES ARE NOW STABILIZED

General business conditions are improving, spring has brought with it a thawing of frozen credits, and there is nothing on the horizon which threatens to set back industry in the opinion of high government officials interviewed in Washington recently by representatives of the National Automobile Chamber of Commerce, unless perhaps it be a cash bonus.

Of particular interest was the comment of Governor W. P. G. Harding, of the Federal Reserve Board, who said that money rates are now stabilized except in the smaller communities and improving even there. Agricultural sections have been aided by advances in commodity prices and, save for sections of northern Texas, southern Oklahoma and Idaho, all districts have responded to the growing demand. Nothing is seen that will affect adversely the credit of those engaged in the automotive industry where the usual requirements of the bankers are met.

One of the most interesting conferences attended by the N. A. C. C. representatives was that of representatives of numerous trade associations with Secretary Hoover, when trade association activities were surveyed with a view to clarifying relations between these spokesmen for industry and those who represent government. Mr. Hoover made it very plain that "open price" associations, whose purpose, expressed or otherwise, is a violation of the Sherman Anti-Trust Act, could receive no coöperation from his department, and his advice to associations generally was to avoid the "twilight zone," where the legality of association activities may fringe upon the borderland of illegal practice. At the same time he empsasized his conviction that only a very small percentage had come within this definition, and gave cordial endorsement to those other organizations which, like the N. A. C. C., have concerned themselves with securing better service for the public.

Among the speakers at this conference was Commissioner Gaskill of the Federal Trade Commission, who spoke for amendments to the present law which would be affirmative in expression instead of purely negative. Trade associations, he said, should be given an indication of legitimate fields for coöperative effort. Senatod Walter Edge of New Jersey, author of the senate resolution calling for an inquiry into trade association practices, took much the same position, saying that he felt that industry should be given a full opportunity to develop the reasons for trade coöperation. His own viewpoint was expressed in the statement that associations generally are a grouping together of smaller companies which enables them to carry on coöperatively research and investigations of value to the public which only large companies could hope to handle alone. Senator Edge's resolution is now pending, while a similar bill has been introduced in the house by Congressman McArthur. Passage would be followed by creation of a congressional commission with power to hold hearings and make recommendations.

Representatives of the N. A. C. C., the Rubber Association, Motor & Accesory Manufacturers' Association, Automotive Equipment Association and kindred manufacturing organizations "sat in" with Mr. Hoover for a discussion of world distribution of highway transport and later participated in a more detailed discussion of foreign trade with the chiefs of the automotive and other divisions of the department. The general feeling expressed was that export conditions show an improvement. Constructive suggestions to better the already excellent service of the department were discussed and the need for improved service abroad emphasized. The basis was laid for educational effort by the asociations to work with the promotional efforts of the department.

Tentative approval has been given by officials of the Chamber of Commerce of the United States to a program of highway transport during the annual convention of the Chamber in Washington in May. A. J. Brosseau, president of the International Motor Company, has been named as chairman of the division and prominent speakers will be secured to discuss the economic foundation of highway transport, regulation, state programs and other relevant subjects.

The meeting of the national counsellors of the Chamber will be held May 15, the day preceding the first session of the general meetings, when nominations for the Board of Directors of the Chamber will be acted upon. Among those nominated is W. O. Rutherford of the Rubber Association, vice-president of the B. F. Goodrich Rubber Company, whose name has been entered for a director from the domestic distribution section. The Chamber has also received and approved for discussion resolutions on taxation, highway transport and antidumping from the N. A. C. C.

In those sections of especial interest to the automotive industry it is noted that all motor vehicles are subject to a 25 per cent. import duty, which under the terms of a general provision may be increased to 50 per cent. in the case of discrimination by any foreign country against the American product. Aluminum is given protection of 5 cents per pound, while oil remains on the free list. The Finance Committee of the senate did not include a reimportation penalty in the bill, but according to members will probably discuss that question separately. Incidentally the Graham resolution, which would place a 90 per cent. *ad valorem* duty on reimportations, and has been passed by the house, was again objected to, this time by Senator King of Utah, and therefore failed of consideration. The tariff bill as reported has for its base a foreign as against the proposed American valuation of the house bill, with discretionary powers for the president. A protracted debate is anticipated once the measure reaches the floor.

During the debate on the postoffice appropriation bill, the senate attached a rider thereto authorizing expenditures for highway purposes under the federal-aid act of $50,000,000, $65,000,000 and $75,000,000, respectively, for the fiscal years 1923, 1924 and 1925. Forest roads were awarded $7,500,000 annually for 1924 and 1925 under the terms of the same provision. The house had already passed the measure without the rider, hence it now goes to conference.

Meanwhile a new bill has been reported by the house committee which provides $65,000,000 for 1923 and $75,000,000 for 1924 and also adds a provision limiting federal aid expenditures to $10,000 per mile. While this is apparently a plea for economy, it is in reality designed to lower the standards of highway construction through a more diffused expenditure. Highway officials are joining in an effort to amend this section, otherwise there seems to be general agreement as to the value of the proposed measures.

Wholesale Gasolene Prices Are Still Mounting Higher

AVERAGE OVER DOUBLE THOSE OF 1915

Recent changes in gasolene prices in various sections of the country have caused an advance in the average wholesale price in thirty leading cities to 21.62 cents a gallon. This is a gain of 0.32 cent a gallon since March 20 and 0.42 cent a gallon over the end of February this year.

At the lowest, the average wholesale gasolene quotation in 1921 was 20.2 cents a gallon, so present levels show an increase of but 1.42 cent a gallon. The present average is still 6.74 cents a gallon below the average price of 29 cents at the beginning of 1921.

Recent advances have included 1 cent a gallon throughout New England, New York and other states on the Atlantic seaboard. The Chicago district price was increased 1½ cent a gallon, while the remaining territory of the Standard Oil Company, (Indiana) price was raised 1 cent a gallon. This latter change affects virtually all states west of the Mississippi to the Rocky Mountains except Texas. The price in Ohio was also raised 1 cent a gallon.

Present wholesale gasolene prices in thirty cities, the low for 1921, and prices on January 1, 1921, 1920, and 1915, follow (in cents a gollon):

	1921		Jan. 1		
	Present.	Low.	1921.	1920.	1915.
Atlanta, Ga.	23.0	20.0	31.0	26.0	10.5
Baltimore, Md.	23.0	21.0	29.5	28.5	9.0
Birmingham, Ala.	20.0	20.0	31.0	27.5	10.5
Boston, Mass.	25.0	25.5	32.0	25.5	14.0
Butte, Mont.	24.5	23.5	33.5	25.5	13.5
Chicago, Ill.	21.0	18.0	27.0	24.0	11.0
Cincinnati, O.	22.0	20.0	30.0	25.0	12.0
Cleveland, O.	22.0	20.0	30.0	25.0	12.0
Dallas, Tex.	18.0	18.0	31.0	26.0	11.0
Denver, Colo.	22.0	22.0	32.0	25.0	13.0
Des Moines, Ia.	22.4	19.5	28.5	24.0	9.5
Detroit, Mich.	22.2	19.9	28.8	24.5	10.5
Houston, Tex.	18.0	18.0	29.0	26.0	11.0
Indianapolis, Ind.	21.8	18.6	28.3	25.5	11.0
Kansas City, Mo.	20.2	15.0	26.5	23.4	10.3
Louisville, Ky.	21.0	23.0	28.5	26.5	11.5
Memphis, Tenn.	20.5	22.0	30.0	25.0	12.5
Milwaukee, Wis.	21.9	19.3	27.9	24.1	11.0
Minneapolis, Minn.	21.7	19.2	28.2	25.0	11.0
New Orleans, La.	20.5	19.5	28.5	22.5	10.5
New York, N. Y.	25.0	24.0	31.0	24.5	12.0
Omaha, Neb.	22.0	18.5	29.5	24.0	11.5
Philadelphia, Pa.	24.0	21.0	31.0	25.2	10.0
St. Louis, Mo.	20.9	16.2	26.2	23.5	10.1
St. Paul, Minn.	22.2	21.2	28.2	25.0	11.0
San Francisco, Cal.	21.0	21.0	27.0	21.5	10.5
Seattle, Wash.	23.0	23.0	28.0	22.5	11.5
Tulsa, Okla.	16.0	17.0	28.0	23.0	9.5
Vicksburg, Miss.	20.0	21.0	28.0	25.0	11.0
Wilmington, Del.	24.0	21.0	31.0	25.3	12.0

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Motor Haulage Big Factor In Modern Farmer's Life

ADEQUATE ROADS MUST BE PROVIDED

Motor transportation, according to Chairman Sydney Anderson, will figure conspicuously in the report to be made to Congress by the Joint Commission of Agricultural Inquiry.

"Nothing since the advent of the railroads," he said, "has had so marked on economic and sociological effect upon the productive life of the country as the motor vehicle. The commission will recommend that Congress continue to promote an adequate program of highway construction and maintenance, directed to the more effective correlation of highway transportation with rail and water transportation. Also, that the program of highway construction and maintenance by states and counties be continued under the direction of qualified experts, with particular reference to the construction and maintenance of farm-to-market roads; that adequate funds should be appropriated for research and regulation of traffic based upon the facts so ascertained. Also, that the several states coöperate in effecting a uniform basis for taxing motor trucks and other motor vehicles, which shall fairly represent the proportion of expense of highway construction and maintenance chargeable to such vehicles."

Previous to the truck's appearance the economic zone of transportation was sharply defined by the haulage range of the horse and the cost of such transportation. It will be shown in the report that in 1918 the estimated cost of hauling in wagons from farms to shipping point averaged about 30 cents per ton-mile for wheat, 33 cents for corn, and 48 cents for cotton. For hauling in motor truck or by tractors the averages are 15 cents for wheat and corn and 18 cents for cotton. In the same year wagon hauling averaged 9 miles from farm to shipping point and motor truck hauls 11.3 miles; the motor truck averaged 3.4 round trips per day over its longer route, while wagons made 1.2 round trips per day.

"It thus appears," said the chairman, "that the major result accomplished by this new form of transportation has been to extend and broaden the markets of the farmer. Single reactions are to be found in the fact that the use of the motor vehicle has brought the farmer closer to the city and also has increased the desirability and comfort of farm life."

Figures in the report will show that, while the motor vehicle traffic has increased more than 1,900 per cent. in the period 1910 to 1921, the actual expenditures for highway construction and maintenance, taking into consideration the increase in cost of materials and labor during the war and the readjustment period, was only slightly over 200 per cent.

In some sections the combination of inbound farm products and outbound supplies by motor truck has concentrated upon the motor service the majority of the traffic within 30, 40 and 50 miles, and the commission believes that the effect upon rail carriers has been to reduce the amount of local way freight, and that ultimately it will reduce the number of local freight-trains operated.

"Since the growth in the use of the motor vehicle has been very markedly in advance of highway construction and maintenance," Chairman Anderson said, "and since it has brought with it a new and heavier form of highway traffic, it becomes evident that large funds will have to be expended, if the 2,500,000 miles of rural highways in the United States are brought up to the standard of efficiency comparable to the extended use of the roadbeds.

"Another effect of improved highways is that they enable the farmer to hold his products on the farm for a longer time. Where highways are unimproved, the farmer must move his produce when the roads are good, which is generally at the season when the prices are lowest. Improved highways thus make not only for a broader market but for a more stabilized one.

"The commission believes there should be regulation of the use of the highways, especially with respect to overloading and maximum loading to be based upon the facts. It will also urge that, since poor highways not only increase the cost of transportation of commodities from farm to market, but also affect the comfort of the farmer and prevent him and his family from a full enjoyment of communication with his neighbor, all highways wherever possible should be improved and adequately maintained.

"It is already clear that there is a wide variation in principle and application of the various state and local regulations affecting intrastate motor traffic. Studies of local motor transportation should be expended as rapidly as possible to afford a definite and comprehensive basis for uniform regulation of motor transportation in order that the inconvenience, expense and inefficiency of operation occasioned by a lack of uniformity in state and federal legislation in the future may as far as possible be avoided."

Electric street-railways, the joint commission has found, have suffered to some extent from the encroachment of the motor vehicle upon their revenues. "This competition," the chairman said, "which is the first competitive activity to be felt by the street-railway, has not seriously affected the revenues except in individual cases, and will not be fatal to their successful operation where these competing forms of transportation are subject to regulation and control by the proper regulatory bodies. When they are required to assume the same responsibilities as to service rendered and license fee and taxes paid they have not proved to be detrimental to existing transportation agencies."

Overland Truck Ready

An Overland "4" chassis, redesigned for truck use, has been brought out by the Willys-Overland Company and will sell for $450 f.o.b. Toledo. The truck chassis differs from the passenger chassis in that it has heavier axles, stronger rear springs and a round gasolene tank mounted directly above the dash. The tank has been placed in this position to allow the use of standardized types of truck bodies designed by various manufacturers for 100-inch wheelbase chassis.

New York Transportation's Profits Exceed One Million

A SURPLUS OF $2,362,690 REMAINS

The annual report of the New York Transportation Company and subsidiaries, including the Fifth Avenue Coach Company, for the year ended December 31, 1921, shows net profits, after all charges and taxes but before dividends, of $1,115,065. This compares with $766,819 in 1920. The balance sheet as of December 31, lists total current assets of $2,683,192 as against current liabilities of $742,006. The year previous current assets were $2,041,506 and current liabilities were $632,557. The final surplus at the close of 1921 was $2,362,690 as compared with the previous surplus of $1,717,624.

The consolidated income account for the year shows operating revenue of $1,754,833. This is made up as follows: Gross earnings—operation of stage lines, $5,221,695; private hire, $12,641; advertising, $95,499; miscellaneous, $112,019; total, $5,441,854; operating expenses—maintenance of plant and equipment, $866,685; traffic and transportation expenses, $2,385,897; general expenses, $434,439; total, $3,687,021; net operating revenues, $1,754,833.

To this is added other incomes totaling $139,976 and deducted for taxes and bad debts written off $658,855, leaving income from operations, $1,235,954. Deductions for loss on sales of securities, equipment and material and charges applicable to prior years, $120,888, brought the net for the year to $1,115,065. This added to previous surplus, $1,717,624, less dividends, $470,000, left a surplus at the end of the year amounting to $2,362,690.

The company's balance sheet as of December 31, 1921, lists total assets and liabilities of $5,705,347. The statement in condensed form is given herewith.

ASSETS.	
Land and buildings	$1,654,062
Equipment	1,648,865
Franchise, rights, etc.	27,206
Shop tools, machinery, furniture and fixtures	130,644
	$3,460,777
Less—Reserve for depreciation	813,598
Total fixed assets	$2,647,179
Materials and supplies at cost	356,134
Accounts and bills receivable	188,826
Marketable securities at cost	*2,168,376
Cash at banks and on hand	325,990
Deferred charges	18,842
Total	$5,705,347
LIABILITIES.	
Capital stock—235,000 shares at $10 par	$2,350,000
Accounts payable, including dividend payable	304,099
Taxes accrued, including provision for Federal taxes	437,907
Reserve for workingmen's compensation insurance	16,654
Reserve for injury and damage claims and other contingencies	233,997
Surplus	2,362,690
Total	$5,705,347

*Market value Dec. 31, 1921, $2,201,920.

At the rate truck orders are coming in to the manuacturers 1922 sales are going to be more than those of 1921. The Federal Motor Truck Company is already behind on orders and every purchaser seems to want immediate delivery.

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Points in Char-a-bancs Design

By A BRITISH MANUFACTURER

UNFORTUNATELY in the past a number of proprietors of motor coaches have looked upon these vehicles as the poor man's motor car, and have not troubled to give that comfort in the vehicles offered to their customers that would have been the case if they themselves were regularly using the vehicles. Other proprietors appear to follow the rule that, because in the past they themselves, or their competitors, have used a 3- to 4-ton truck chassis with a 30t-passenger body, this is the best type of vehicle to use today, and argue that lighter vehicles with possibly less horse-power will not satisfactorily perform the same work.

A 30-passenger body with passengers averaging 140 pounds will not exceed roughly 2 tons; a body should not weigh more than 1 ton, so that we get a gross load on the chassis of 3 tons. Now, when a 3- to 4-ton chassis is used for this work, which usually has a gross carrying capacity of approximately 4½ tons, not only is the chassis grossly unladen to the extent of 1½ tons, but a very important point not to be overlooked is that the chassis has been built necessarily heavy to carry the gross load for which it was originally designed, the chassis usually weighing itself approximately 3 to 4 tons.

If, however, a smaller capacity chassis is used which has a gross carrying capacity of, say, 3 or 3¼ tons when it is carrying 30 passengers, not only will the chassis be carrying the load for which it was designed, and therefore run with the greatest comfort, but an equally important point is that this type of chassis need not weigh more than 2¼ tons, so that compared with the heavier vehicle the engine is having to supply power to drive a vehicle which weighs approximately 1 ton less. Bearing this in mind, therefore, it will be obvious that a smaller capacity engine can be employed than is fitted in a 3- to 4-ton chassis, with an appreciable saving in gasolene and oil, and on the score of reduced weight the vehicles can be of smaler, and less costly size with reduced running costs.

For engines and chassis of equal efficiency running under the same conditions the gasolene consumption is entirely dependent on the ton-miles per gallon, so that if the total weight of a vehicle with its full complement of passengers weighs, say, in the case of a 30-passenger car approximately 5.1 tons—being made up of passengers 4,200 pounds, body 2,240 chassis 5,040—and does 10.75 miles to the gallon, i. e., 55 ton-miles per gallon, another vehicle under the same conditions with equal efficiency, but weighing 1 ton more, will only do 9 miles per gallon.

These are also entirely dependent on the vehicle's ton-miles (other things being equal). The sizes of tires fitted are, of course, in relation to the total weight of the vehicle loaded, and assuming any size of tire will do the same mileage, obviously the cost of a set of tires for a vehicle the total weight of which is 5.1 tons will be considerably less than those required by a vehicle weighing 1 ton more.

Other economies are also effected on the score of reduced capital outlay, interest on capital, depreciation, wear and tear, and oil consumption.

As a guide to the size of chassis required (i. e., gross carrying capacity) for different sizes of coach bodies, the following may be taken as approximately correct, and will only be varied slightly by the difference in weight of bodies of varying designs, the average weight of the passenger being taken as 140 pounds in each case.

TABLE I.

Passenger Capacity.	Weight of Passengers and Driver. (Lb.)	Approximate Weight of Body and Equipment. (Lb.)	Gross Load on Chassis. (Lb.)
14	1,960	1,344	3,304
20	2,800	1,792	4,592
25	3,500	2,016	5,516
30	4,200	2,240	6,440

It should be particularly remembered that when manufacturers of chassis refer to a type of chassis by its weight-carrying capacity, they generally (although not always) refer to the *net load* to be carried, after making allowance for body. What a prospective purchaser should be particularly clear upon, however, is the *gross load*, i. e., including body.

While undoubtedly there will be a large demand in the future for 14 and 20-passenger coaches, at the same time there will be a good demand for 25-and 30-passenger coaches, the actual size of the vehicle being dependent on a number of conditions, which vary with the district in which the coaches operate.

One point is, that the driver's wages—whether the vehicle be large or small—will be much the same, and will have to be spread over the number of passengers carried. If large parties can be got together comparatively easily, but the rate which they are prepared to pay is low, then a 25- or 30-passenger vehicle would probably be the better paying proposition, or possibly even a larger vehicle if it was not too cumbersome on the road. On the other hand, if it is as difficult to get together the larger parties, and a vehicle with the smaller number of seats could be filled more frequently, this would be the most economical. In any case, for the better class of passengers, who would be prepared to pay slightly higher rates, undoubtedly the smaller capacity vehicles would always be preferred.

However, in all fleets of coaches it will undoubtedly be found that it will pay to have one or more smaller capacity vehicles, when for any reason the full complement of passengers can not be obtained for one of the larger vehicles, as it is of the highest importance that motor coach proprietors, when they have booked seats or advertised runs, should not break faith with the customers and should run at any cost. Unfortunately, in the past this is a point which some proprietors have not given that consideration which the matter deserves.

Spring suspension is a point which deserves far more attention than the subject is generally given, not only the springing of the chassis, but also the springing of the cushions, and in the design of motor coach chassis advantage should be taken of the large experience which has been gained in the manufacture of touring cars.

It will generally be found that the best sprung touring cars are those designed with long leaves and cantaliver springing, or underslung springs of semi-elliptic pattern, both of which are designed with a view to attaining the same end, viz., better springing, and the elmininationof that tendency for the wheels on opposite sides of the vehicle to get out of track when traveling over an uneven road. The exact reason for this is not generally understood, and it can be best explained by taking the case of semi-elliptic springs (*a*) overhung, (*b*) underslung.

In overhung springing, when the wheel goes over an obstaclee and the spring is compressed, or alternatively when the wheel drops into a depression and the spring rebounds, the axle travels through a radius with the front shackle-pin approximately as the center; and in this case it will be noticed that for a 4-inch movement of the axle above and below the normal spring position when loaded, the axle actually travels backwards and forwards in relation to the chassis a considerable distance.

With underslung springs, the idea in designing is to get the center of the axle as near as possible on a horizontal line with the center of the front shackle-pin. With a 4-inch movement up or down of the axle, although the axle still travels on a radius with the front spring-eye approximately as a center, the actual horizontal backward and forward movement of the axle is a negligible amount. This backward and forward movement of the axle, if it occurs on one wheel only, at any particular moment, which is more frequently the case, obviously increases or decreases the wheelbase momentarily on that side of the vehicle compared with the other. This action tends to throw the vehicle out of its course, is uncomfortable for the passengers, and causes excesive wear on the tires. To show how much this horizontal movement of the rear axle amounts to in the case of the two different types of springs, assuming that in both cases the rear springs are 4 feet 6 inches in length, the horizontal movement of the back axle for a vertical movement of 4-inch up and down gives approximately the following results: Overhung springs, horizontal movement of .1 ⅞ inch; underslung springs, horizontal movement 7/32 inch.

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A very good asset to good springing which is not generally appreciated is a system of oil lubricators on the spring leaves, otherwise in course of the time the action of the springs get harsh, owing to the rusting of the working faces of the spring leaves.

Another advantage which underslung and cantaliver springs give is that by careful design the chassis can be got considerably lower without reducing the ground clearance than would be otherwise possible with overhung springs, and to show what can be done in this direction the writer's firm has got the chassis height down to 2 feet 6 inches from the ground on its chassis for 20, 25 and 30-passenger coach bodies.

In connection with this question of chassis height, the writer does not altogether agree with the view which recommends a special type of rear axle, as it will be found that where tires of the same diameter are used the chassis height or alternatively the floor of the body has to be increased above the minimum which is possible with other axles, owing to the increased height of the axle casing from the center where an overhead drive is used. Although other types of axle may be more expensive, it is well worth the advantage, in the writer's opinion, of the lower chassis height. Passengers do not like being perched up in a vehicle sky-high, and the nearer the height and appearance of a motor coach approaches to that of a large modern touring car, the greater will be the number of passengers to whom the vehicle will appeal. Also, the lower the vehicle is kept, the less the wind resistance, and this has a greater influence on gasolene consumption than is generally imagined.

Table II gives various particulars of motor coach chassis from 14 to 30-seaters. The gasolene consumption naturally varies slightly according to whether the vehicle is operating in a hilly district or otherwise, but 55 ton-miles per gallon can be taken as a fair average fuel consumption of an efficient vehicle in the hands of the average driver.

Motor coach proprietors do not want to think that they have only to cater to the working classes, this assumption being entirely incorrect, as is evidenced by the large number of motor car owners who patronize comfortable coaches for short and long tours.

In spite of the various competitive forms of passenger transport, if at least the same degree of comfort is given in motor coaches as is obtained in a modern railway car, i. e. seating, leg room, and springing, at a rate not much in excess of the railway fare, motor coaches can not only be made to pay, but tremendous developments are possible, and it is "up" to the motor coach proprietors and manufacturers alike to see that the public is offered vehicles in which to travel having the maximum comfort with the minimum fare, and then to "travel by coach" will defy any other form of public transport, because "the call of the road" is strong in everyone.

Vehicle Shipments Increase 32%

March car-load shipments of all motor vehicle manufacturers (partly estimated), including driveaways and boat shipments converted into car-load equivalents, increased 32 per cent. over February and were 65 per cent. greater than March last year: It is estimated that approximately 159,120 cars and trucks were produced by all makers during March, 1922, compared with 122,429 in February and with 110,525 in March, 1921.

Members of the National Automobile Chamber of Commerce during the first quarter (March partly estimated) produced 207,560 cars and trucks, or 220 per cent. of the corresponding period in 1921. All manufacturers reporting produced 371,798 cars and trucks during the first quarter of 1922, or 162 per cent. of the same period a year ago.

Factory shipping figures for all manufacturers the first quarter this year compared with corresponding period of 1921 and for the other months of 1920 and 1921 follow:

	Carloads.		Driveaways.		Boat.	
	1922.	1921.	1922.	1921.	1922.	1921.
March	*25,210	16,287	*15,804	9,939	264	75
February	19,636	9,986	10,173	7,507	180	99
January	15,297	6,485	7,467	3,185	143	93

*Partly estimated.

	Carloads.		Driveaways.		Boat.	
	1920.	1921.	1920.	1921.	1920.	1921.
April	17,147	20,187	64,634	14,197	.....	1,619
May	21,977	18,608	74,286	15,193	.....	2,381
June	22,516	20,269	60,746	18,834	8,350	3,947
July	23,082	19,470	52,342	15,320	8,702	3,725
August	23,386	20,350	34,060	14,290	7,095	3,565
September	20,804	20,150	24,431	13,550	5,469	3,580
October	17,209	17,323	14,127	11,257	2,519	2,300
November	13,253	14,061	9,497	10,509	659	1,385
December	11,802	12,100	6,469	7,500	89	134

British Exports in February

During the month of February British manufacturers exported 27 motor trucks valued at $107,175; 111 passenger-cars worth $352,615; and chassis to the number of 52, worth $165,585. The unit values work out at $3,970 per truck, $3,175 per passenger-car, and $3,185 per chassis. These figures represent a substantial loss as compared with January. On the other hand, imports showed a considerable increase over January. Eleven trucks worth $10,490; 854 passenger-cars worth $814,980; and 1,009 chassis valued at $1,001,145, were imported. The unit values work out at $955 for the trucks, $955 for the passenger-cars, and $990 for the chassis.

Ninety 'bus lines in Maryland have an average of 3 vehicles per line, carrying an average of 16 passengers per vehicle that operate over an average distance of 19 miles per one-way trip.

TABLE II.

Passenger Capacity.	Gross Carrying Capacity of Chassis. (lb.)	Gross Load on Chassis. (lb.) (Table I.)	Weight of Chassis. (lb.)	Approximate Weight of Body and Equipment. (lb.) (Table I.)	Total Weight of Vehicle Loaded. (lb.)	Gasolene Consumption at 55 Ton-Miles per Gallon. (m. p. g.)
14	3,920	3,304	2,800	1,344	6,104	20.20
20	6,160	4,592	4,480	1,792	9,072	13.60
25	7,280	5,516	4,816	2,016	10,332	11.95
30	7,280	6,440	5,040	2,240	11,480	10.75

Traffic Body Will Discuss Road Transport Problems

SPEEDS, WEIGHTS, DIMENSIONS, FEES

The program of the annual meeting of the National Highway Traffic Association, which is to be held on May 12 at the Automobile Club of America, has been announced by President Arthur H. Blanchard. Among the subjects listed for discussion at this meeting are traffic safety, regulations governing speeds, weights and dimensions of motor trucks and trailers, license fees and highway franchises.

The national chairmen who have been asked to make reports at this conference are: Elmer Thompson, secretary, Automobile Club of America, on uniform highway signs; Herschel C. Smith, assistant professor of highway engineering, University of Michigan, on traffic capacity and widths of highways outside of municipalities; H. Elting Breed, consulting engineer, New York City, on the status of the construction of highway curves and recommended practices to increase traffic safety; F. W. Fenn, secretary, National Motor Truck Committee, National Automobile Chamber of Commerce, on highway transport franchises; Tom Snyder, secretary, National Association of Commercial Haulers, on highway transport clearing-houses; George H. Pride, president, Heavy Haulage Company, New York City, on regulations governing speeds, weights and dimensions of motor trucks and trailers, and Henry G. Shirley, roads and sanitary engineer, Baltimore County Roads and Sewerage Department, on license fees and motor vehicle taxation.

"In taking up a discussion of these subjects the association is endeavoring to mold sound public opinion and to make it possible for the best thought to be concentrated on some of the most important public questions of to-day in the traffic world," declared President Blanchard in commenting on the program. "I am fully convinced that it is high time for the National Highway Traffic Association to take a definite stand on the subject of highway transport franchises. Some legislatures will give consideration to this subject during their sessions this year and a great many will take it under consideration and pass legislation relative thereto at the 1923 sessions."

There are 36 electric traction companies now operating 'buses. These are located in various sections of the United States including Boston, Bakersfield (California), Minneapolis and Forth Worth (Texas).

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German Truck Prices

A report from the commercial secretary at Cologne to the Department of Overseas Trade in England announces that the convention prices for trucks have been increased as follows: 2-ton trucks from 225,000 marks in December last to 370,000 marks, 3- to 3½-ton trucks from 245,000 marks to 390,000 marks, and 4-ton trucks from 265,000 marks to 410,000 marks.

There are also considerable surcharges. It is stated the standard prices of the Association of German Automobile Manufacturers for omnibuses have been increased as follows: 6 horse-power omnibus chassis, without tires, from 90,000 to 175,000 marks; 10 horse-power omnibus chassis, without tires, from 142,000 to 280,000 marks; and 16 horse-power omnibus chassis, without tires, from 180,000 to 360,000 marks. The horse-powers, to say the least of it, seem somewhat low, but it is not stated on what basis they are taken.

City Milk Delivery at 1.07 Cent a Can

By B. METZGER

Milk Dealer, New York City

WE are doing 50 per cent. more business since we bought our 2-ton truck five months ago. We are in the wholesale milk business, and our customers consist of groceries, restaurants and soda-fountains. We cover a territory extending from the East River to the Hudson River, and from 129th Street up to 207th Street. Up to September, 1920, we handled our milk delivery with teams. Then our attention was attracted by the excellent record made by a truck in the service of another milk dealer in our neighborhood, and we decided to change from horses to trucks. We bought a 2-ton Garford, and were at once able to extend our delivery range to take in a great many customers whom we could not reach economically with horses.

The truck delivers 75 ten-gallon cans of milk a day, whereas with horses we delivered only 50 cans a day. This is a 50 per cent increase in the business done. Since the average price of milk is about $4.00 a can, the addition of 25 cans means $100.00 a day more business, or $36,500.00 a year. As there has been practically no increase in overhead, this additional business is largely velvet."

There is also a direct saving over the cost of horse delivery, because it would take at least two teams to handle the work done by the truck. Since a team with a driver is worth about $14.00 a day, we are saving the difference between $28.00 a day and the cost of operating our machine, which is only $15.08 a day. This saving amounts to $12.92 a day, or $4,715.80 a year to add to our profits. If we had to use horses, we could make more money with one team working a restricted district than with two teams in a bigger field.

The truck starts out at 2 o'clock every morning and goes to the freight station at 12th Avenue and 132nd Street, about 1½ mile away. There it picks up 75 cans of milk containing 10 gallons each, and starts on its delivery round. It makes an average of 50 stops on this run, and returns to the plant about 6 o'clock in the morning. After the driver has had his breakfast, he makes a second trip over the same route to collect the empty cans and the money, returning about noon. Parts of the route are hilly, but the pavements are mostly asphalt.

We pay $40.00 a week to our driver, because he has to be exceptionally fast and dependable to cover the route and collect the money. Our actual repairs have been only $3.00 to date, but we are allowing $300.00 a year for maintenance and repairs. We are figuring a high mileage on tires, 16,000, basing our estimate on the experience of a neighbor with an identical truck in the same work. Our 2-ton truck, as I said, costs $15.08 a day, 40.12 cents per mile, 10.05 cents per can, and 1.07 cent per can-mile. These costs are very satisfactory.

So far the truck has not lost a single day, and we have been operating it every day for five months. When any little thing goes wrong, the local dealer is right on the job to make it right.

OPERATION.

Days operated	153
Miles traveled	4,750
Miles per day	37.6
Miles per gallon of gasolene	4.7
Miles per gallon of oil	100.00

AVERAGE COST.

Cost per day (including driver)	$ 15.0782
Cost per mile	.4012
Total cost for period	2,306.45

ITEMIZED COST.

Driver cost per day (included above)	$ 5.71
Depreciation per mile	.0705
Maintenance and repair:	
Actual, total	3.0000
Actual, per mile	.0005
Estimated, per mile	.0217
Tire cost, estimated, per mile	.0148

5-Ton Truck Does Work of 3 to 4 Teams

By A. APPELL

Appell Brothers, New York City

OUR second Selden truck—a 5-tonner—was bought on the record of our first, which has been giving very satisfactory service for two years. The new truck is operating for a cost of only $23.84 a day, including driver, and doing the work far more quickly and economically than it could be done by horses. We find trucks very dependable, a feature which we greatly appreciate, because we are unusually busy, and are hiring trucks to do some of our work.

We are in the general trucking business, specializing in hauling packing-house products for meat brokers. The trucks are hauling meat from the New York Central Railroad yards to various meat markets all over Manhattan, the Bronx, Brooklyn, Jersey City, Hoboken, Newark and other nearby places. A great deal of the meat is hauled for the Westchester Market at 152nd Street, from the New York Central Railroad yard at the foot of 33rd Street.

The new truck is fitted with a panel body, having racks and a top, and is admirably suited to the work. It is usually loaded only one way, but carries 6 to 7 tons. We do not consider this a serious overload, since our men know how to drive, and the streets are good.

Two loads make an average day's work, and the average run is about 25 miles a day. Occasionally, if the trips are short, the truck will make 4 or 5 trips. The number of stops varies with the kind of work, but runs between 3 and 15, averaging about 9. Occasionally all our loads are delivered at one point.

In figuring the operating costs we must include $1,060 overhead, because we are in the trucking busines and all our office expenses have to be charged against the trucks. We estimate that the heavy truck is good for about 6 years' total life. So far it has cost nothing for repairs, but we are allowing $700 a year to take care of this item. The truck costs $23.84 a day with driver, 95.3 cents per mile, $1.8337 per ton, and 29.34 cents per ton-mile. Deducting the driver's wage, the cost is $17.34 per day, and $1.3338 per ton.

According to our experience with horses, covering many years, the new truck is doing the work of 3 or 4 teams. It is much less subject to weather conditions than horses, and can get over the ground faster. Much of the work it is doing is ordinarily handled by horses, but we figure that the truck is giving us more dependable service for about half what horses would cost.

Both trucks are used on practically the same kind of work, the 3½-tonner carrying from 4 to 6 tons, while the 5-tonner carries from 6 to 7 tons. Tabulated, the costs of the two trucks are as follows:

	3½-Ton.	5-Ton.
Miles per day	31.6	25
Average number of trips	3	2
Fixed charges per day	$3.539	$3.741
Overhead charges	3.55	3.55
Variable charges	8.594	10.048
Driver's wages	6.50	6.50
Totals	$22.18	$23.839
Cost per ton	1.85	1.83

Barcelona Motor Show

The date of the Barcelona Motor Show in Spain has been postponed to May 15. Thirteen entries have already been made for American firms and 25 from those of other countries. Each truck or tractor is allotted a space for 25 cubic meters for which 625 pesetas are charged.

A regular motor service is to be inaugurated between Changsha and Siangtarn, China, by the Lung-yan-Changsha-Siangtan Motor Service Company. Six machines have already arrived.

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Rail Motors Cut Labor Bill in Halves

By W. P. HARRIS

RECENT experiments with gasolene-driven cars and comparative costs of operation of this form of equipment and steam trains hold out the hope that passenger service now conducted at a loss on about 50,000 miles of American railroads may be turned to a profit. Including 25,000 miles of short lines and 25,000 miles of branch lines of class one roads, to both of which this sort of equipment is especially adapted, about 19 per cent. of the country's mileage lends itself to the change.

The new rail motors are not suited to service on long, fast runs nor on short, congested runs, such as those in the suburban traffic where the motive power is usually electricity, but they have demonstrated a field in the short runs where population is sparse and travel light. In the case of the short lines, if they pay at all, the deficits of the passenger service are offset by the profits of the freight traffic. In the case of the branch lines the main-line profits take up the deficits, but almost without exception deficits arise from this form of service.

As with so many other mechanical and engineering devices, this one was promoted by the exactions of labor organizations. Take an illustration. A steam train carrying a minimum crew of four leaves for a 15-mile run on a branch line after meeting the morning train on the main line. The run takes an hour, and the branch-line train starts back in time to meet the evening train on the main line 12 hours later. The four members of the crew receive straight time for 8 hours and time-and-a-half for 4 hours. There are instances where the members of such a crew average in wages for two hours' actual work more than the governor of the state, the mayors of the towns between which they run or the presidents of the local banks.

The first thing the rail motor does is to reduce the number of the crew by half. As the wages of engineers and motormen are influenced in part by "weight on drivers," the actual pay is reduced by more than half, the motormen falling under the minimum classification.

The first experiment of this sort was made about 15 years ago on the Southern Pacific during the regime of E. H. Harriman. At that time motor-car plants were turning out nothing of the sort, and the Southern Pacific cars were built in the Union Pacific shops at Omaha. Even a new motor had to be designed as those used in the passenger cars of the day were not suitable. A heavy all-steel coach was produced at a cost of $23,000 to $28,000, and about 45 were eventually built.

There was a large saving in the beginning, but it was cut down somewhat later by union demands affecting the ratings of the operatives. But there was one development of marked importance. The superior service it was possible to give stimulated, not only travel, but settlement along the branch lines in California where most of the cars were placed in operation. Passenger traffic gradually increased until it outgrew motor cars and even trailers, so that most of this equipment has been retired. A few of the cars are still being operated on the Texas lines.

It was the experience of the Southern Pacific that maintenance ran very high, but in this connection it should be remembered that these cars and their parts were built in small numbers in a railroad shop, and not under modern conditions of motor vehicle production.

The experiment with more recent equipment is only four or five months old, but rail motors are on regular runs on the New Haven, Northern Pacific and Pennsylvania systems, on short lines in New Mexico, Louisiana and Florida, while at least a dozen other roads are making trials.

Rail motors for use on steam railroad tracks are being manufactured by Mack, Packard, Brill and possibly others. They are designed to seat from 25 to 45 passengers, and to maintain a speed on level track of 25 to 30 miles an hour, being geared to operate on heavy grades.

The use of these rail motors is still too new to have permitted the accumulation of exhaustive comparisons of costs, but there is no doubt that the few figures available greatly favor the motor over steam equipment. In the case of steam operation, the lightest equipment possible is a locomotive, a tender and a combination passenger and baggage car. With a load of 35 passengers, the weight is 4,000 pounds per passenger, compared with 400 pounds for the gasolene-driven car.

The Pittsburgh & Shawmut line has two cars in operation—one out of Brookville on a 98-mile run and one out of Kittanning, on an 83-mile run. The wages of the crew on these runs are respectively 17½ cents and 22½ cents a train-mile. The cars average 6.8 miles a gallon of gasolene. According to Dwight C. Morgan, vice president, the total cost of operation, including wages, materials and supplies, fuel and 4 per cent depreciation, amounts to 35 cents a mile. The cost of operation of light steam equipment, based on the same method of ascertaining costs, is 71 cents a mile, or more than double.

By giving more frequent service the Pittsburgh & Shawmut has been able to develop business that it would not otherwise have obtained, and this result may be expected to follow where motors are put into use. Being in their nature more like motor 'buses in use on highways than is steam equipment, they may be expected to diminish the effectiveness of competition offered by highway vehicles.

There is some difference of opinion among railroad officials concerning the extent to which rail motors may be profitably substituted for steam equipment, but all agree that there are a great many runs that are ideal for the gasolene cars. The New Haven, following an experience of several months, has ordered more of the cars, and there are 37 branch lines on that system where the substitution can profitably be made.

The rate at which the substitution of equipment will take place depends a great deal on the future of railroad wages. As one prominent official puts it: "When two men are getting all four men are worth, you can rest assured that managements will lose no opportunity to dispense with two men out of every four."

Kelly Tire Gives Up Branches

The recent move made by the Kelly-Springfield Tire Company in consolidating its general offices in the new building at 250 West 57th Street, New York, is indicative of more than merely an effort to organize more efficiently the executive branch of its large business. The truly interesting and significant feature of the reörganization of office arrangements is the fact that the New York branch has been moved to the company's warehouse at 553 West 57th Street, a step which is really equivalent to giving up the branch altogether, since it has now no display rooms, sales counters or any of the other appurtenances of the usual tire store.

For many years the Kelly company, in common with other large tire companies, maintained handsome and attractive showrooms. The Kelly company, however, realized that with the stabilizing of the industry the maintenance of these expensive establishments was a relic of the prosperous days of a rapidly growing industry rather than an economic necessity for a concern manufacturing articles that have now become almost staple products.

With the discontinuance of all retail sales— a step which was taken to protect the dealer—the factory branch was deemed an unnecessary expense which only added to the overhead; in eliminating this expense in all cities, which the company intends to do as soon as practicable, a considerable saving will be effected, and it was partly in anticipation of this saving in operating costs that the prices of Kelly products were recently brought down to a competitive basis.

The company intends to establish warehouses in various centers of distribution where railroad facilities are best suited to give prompt service to its dealers, and where it now maintains branches these will be supplanted by offices, which in many cases will be in the warehouses themselves.

Reo Shows Its Assets

Current assets of the Reo Motor Car Company, Lansing, Michigan, at the close of the fiscal year were in excess of $12,600,000. Current liabilities were about $2,200,000 with net current assets of $10,438,811. The average net profits per year for the last six fiscal years totaled $2,463,224. This amounts to 38.5 per cent. on the present capitalization as against the current dividend of 10 per cent. each year.

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Economics of Motor Transport

By MERRILL C. HORINE
Engineer, International Motor Company

IT is not generally known or even suspected by the great mass of people that the motor truck is to-day transporting approximately one-eighth of the tonnage transported annually by all of the railroads in this country. Motor trucks transport approximately 300,000,000 tons as against about 2,400,000,000 tons transported on rails. Yet, of the 2,000,000 miles of highway in this country, only about 3 per cent., or 40,000 miles, is improved. Motor truck operation is confined principally to this 40,000 miles, which is only 16 per cent. of the 250,000 miles of railroad in the United States. Authorities have been predicting for years that, despite the tremendous size and importance of the automobile industry, the motor-truck business is destined before long to exceed it in size.

The development of the motor truck has been so rapid that highway development has by no means kept pace with it; in fact, highway development lags far behind the requirements for automobiles. It can be said truthfully that modern types of road pavement are the outgrowth of motor-car development, but there is evidence on every hand that the majority of so-called motor-vehicle roads are not adapted to motor trucks.

Until recently, what little scientific research there was in respect to motor transport centered about the economy of the vehicle itself, while that devoted to highways took little or no account of the most economical types of motor truck. Such narrow conceptions inevitably lead to uneconomic conclusions. The student of vehicle efficiency alone soon finds that the larger the vehicle is and, consequently, the greater the useful load that it moves, the more economical in cost per unit of load it will be. The highway engineer, on the contrary, reaches the conclusion that the most economical road is one of light construction, narrow width and general conformity to the topography of the country. The vehicle economist, therefore, urges trucks of the greatest capacity that can be operated conveniently and for which there is sufficient load to carry, and the highway engineer urges nothing but the lightest of vehicles.

The result is a compromise which is neither scientific nor economic, since, as a rule, the actual roads are of insufficient strength and durability to withstand the exactions of prevailing traffic and the average vehicle is too small to produce the haulage economy which is needed. Vast sums are squandered annually on types of road utterly incapable of returning in traffic facility and durability enough value to justify their cost, and the public is obliged to pay, in the cost of commodities, an unduly high transportation cost because of bad roads, poorly adapted routes and unreasonable restrictions upon weight and speed.

Coördination between highway and vehicle development is difficult because of the independent control of vehicle operation and of road-building, but it is impeded still further by the lack of understanding that exists as between the highway authorities and motor truck operators, and by the confusion of issues by the general public. The problem of the railroads has been very much simpler, since those charged with maintenance of way and those responsible for the operation of rolling-stock move under the control of a single directing management, the engineering activity of all branches of the enterprise being consolidated and coördinated. The result has been the development of locomotives and cars capable of moving 5,000 tons in one traffic unit, and of roadbeds and rails capable of supporting such loads at economical speeds. The engineering work devoted to the development of the railroad grade, track, bridges and other works included in the right-of-way has required a degree of intensive study not inferior to that directed toward the perfection of the rolling-stock. Coincident with this work, economic engineering of the highest order has been necessary to coördinate the development of the two so that the result would be conducive to the most economical transportation. Independent work by either the civil or the mechanical branches of railroad engineering could never have reached the point that they have attained in conjunction. Likewise, highway and vehicle engineers can never develop highway transport to its ultimate efficiency without coördinating their activities.

Legislation enacted independently by the 48 little republics that constitute this nation can not do otherwise than increase the economic loss resulting from the mutual unadaptabilty of the motor truck and the highway. The railroads were the target for restrictive attention by legislators not so very long ago, and it is admitted universally that to-day that legislative meddling with the railroads has not been conducive to increased efficiency, lower charges to the shipper, or industrial peace. Hundreds of official inquiries into the cost of living have been unavailing, and the economist's voice in the wilderness pointing to the deep underlying causes is still unheard.

The success of the automotive industry depends upon the degree of utility of its products to the public. Anything that detracts from the utility of the motor truck threatens the welfare of every member of the automotive industry. There is nothing that has so profound an effect upon prosperity as transportation. All industry exists as a result of an unequal distribution of commodities geographically, and consists of the production of a surplus where such production can be carried on most economically to supply a deficiency at some other location. The history of any manufactured article is a history of a long journey; in many and perhaps in most cases the cost of all stages of it represents the greater part of its cost.

Motor transport economics, therefore, represents the means whereby the public can be enabled to derive more benefit from the product of the automotive industry, and involves the scientific study of all factors relating to the transportation of loads over roads. The study of motor transport economics calls for engineering, both civil and mechanical, the principles of which are common and combine consideration of mechanical efficiency, road structure and commercial traffic. It contemplates highway transport in relation to the interests of the public as a whole.

Appended is an outline of the principal elements of the subject in their intricate relation. Each element is combined with related elements to form a single factor. These factors, in combination with other related factors, are reduced to terms whereby a balance can be secured between antagonistic consideration to make up a coherent conception of their interrelation. For lack of precedent, arbitrary terms have been used to designate the various factors and groups of factors. The entire subject has been reduced to a single term, that of "economic efficiency."

Economic efficiency, therefore, embraces the following topics:

A. Highway Efficiency.

A1. ADAPTABILITY OF ROAD TO CARRIER.
- A1. 1 Road Capacity.
  - A1. 11 Width of Road.
  - A1. 12 Pressure Capacity of Surface.
  - A1. 13 Impact Capacity of Road Structure.
  - A1. 14 Seasonal Limitations.
- A1. 2 Tractive Resistance.
- A1. 3 Grades.
- A1. 4 Route.
- A1. 5 Curves and Corners.

A2. ADAPTABILITY OF CARRIER TO ROAD.
- A2. 1 Dimensions.
- A2. 2 Capacity and Weight.
- A2. 3 Speed.
- A2. 4 Climbing Ability.
- A2. 5 Accelerating Ability.
- A2. 6 Stopping Ability.
- A2. 7 Turning Radius.
- A2. 8 Tractive Effort.

B. Transport Efficiency.

B1. ADAPTABILITY OF CARRIER TO VOLUME AND CHARACTER OF LOAD.
- B1. 1 Total Load Units to be Carried.
- B1. 2 Range of Load Units to be Hauled.
- B1. 3 Average Load Units to be Hauled.
- B1. 4 Density of Load.
- B1. 5 Length of Haul.
- B1. 6 Route.
- B1. 7 Number and Probable Duration of Stops for Load.

B2. COMPARATIVE ADAPTABILITY OF MOTOR TRANSPORT.
- B2. 1 Horse Transport.
  - B2. 11 Highway Efficiency.
  - B2. 12 Transport Efficiency.
  - B2. 13 Vehicle Efficiency.
  - B2. 14 Public Health.
- B2. 2 Railway Transportation (including Trolley Express).
  - B2. 21 Transport Efficiency.
  - B2. 22 Economy.
  - B2. 23 Haulage Cost.

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B2. 24 Packing Cost.
B3. ADAPTABILITY OF CARRIER TO TRAFFIC.
B3. 1 Legal Restrictions on Equipment and Operation.
B3. 2 Possible Average Running Speed.
B3. 3 Bridges and Ferries.
C. Vehicle Efficiency.
C1. OPERATION.
C1. 1 Moving Factor.
C1. 11 Loading Delays.
C1. 12 Unloading Delays.
C1. 13 Waiting for Loads.
C1. 14 Clerical Delays.
C1. 15 Loafing.
C1. 16 Traffic Delays.
C1. 2 Load Factor.
C1. 21 Body Capacity; Load Density.
C1. 22 Special Deliveries.
C1. 23 Return Loads.
C1. 24 Outside Hauling (Custom Work).
C1. 25 Pick-ups.
C1. 26 Deliveries.
C1. 27 Trailers.
C2. MAINTENANCE (Active Factor).
C2. 1 Disability Lay-ups.
C2. 11 Chassis Repairs.
C2. 12 Body Repairs.
C2. 13 Accessory Repairs.
C2. 14 Tire Repairs and Replacements.
C2. 15 Overhaul and Painting.
C2. 16 Driver's Disability.
C2. 2 Requirement Lay-ups.
C2. 21 Seasonal Fluctuations.
C2. 22 Off-peak Periods.
C2. 23 Shutdowns.
C3. 24 Labor Troubles.
C3. ECONOMY.
C3. 1 Earning Factor.
C3. 11 Unit-miles.
C3. 12 Packing Cost.
C3. 13 Loading Cost.
C3. 14 Unloading Cost.
C3. 15 Time in Transit.
C3. 151 Marketability.
C3. 152 Insurance.
C3. 153 Interest on Value.
C3. 154 Shrinkage and Breakage.
C3. 155 Perishability.
C3. 156 Tracing and Follow-up.
C3. 16 Advertising Value.
C3. 17 Good-will of Trade.
C3. 18 Increased Radius of Trade.
C3. 19 Increased Business Turnover.
C3. 2 Cost Factor.
C3. 21 Operating Cost.
C3. 211 Fixed Charges.
C3. 212 Maintenance Charges.
C3. 213 Running Charges.
C3. 22 Overhead.
C3. 221 Loading Devices.
C3. 222 Shipping-room Devices.
C3. 223 Office and Clerical Expenses.
C3. 224 Telephone.
C3. 225 Labor.
C3. 2251 Loaders.
C3. 2252 Watchmen.
C3. 2253 Clerks.
C3. 2254 Supervisors.
C3. 2255 Accountants.
C3. 226 Traffic Department.
C3. 227 Miscellaneous.

Economic efficiency, as related to highway transport, can be defined as the measure of net benefit derived by the community arising from the operation of a motor transport installation. We of the automotive industry must get into the habit of thinking of motor transport economy in the terms of cost to the consumer. We can not hope to have the strong, hard, smooth, wide highways, connecting industrial centers by direct routes, which we know are essential to the proper and continued expansion of the motor truck industry, before the public shall have been convinced that the cost of such roads is merely an investment in cheap transportation that will be returned with interest in the form of lower commodity prices by reason thereof.

The highway industries must likewise revise their conception of the motor vehicle, and particularly of the motor truck, from that of a trespasser on the roads to that of an essential and economical carrier capable of earning its share of the cost of roads capable of accommodating it. They must be brought to realize that the highway exists for the benefit of the vehicle, that its usefulness consists of its ability to serve the vehicle, and that its economic justification is the saving in transportation cost that it enables the vehicle to effect.

Finally, the general public must realize its position as a stockholder in every transportation enterprise. Public investment in highways pays dividends in the form of lower transportation costs than would prevail without them, and in proportion to the extent to which highways and vehicles are adapted, on the one hand, and the extent to which this adaptability permits the operation of the most economic types and sizes of motor trucks and methods of operation on the other hand. Taxation of motor trucks out of all proportion to the benefits derived from their operation does not shift the burden from the commonwealth to the private pocket of the truck owner, but simply requires that highway cost be paid in the form of increased cost of commodities instead of in taxes, with the constant danger that the continual readjustment of charges for haulage and commodities hauled by motor truck users will result in waste and commercial losses, including the retardation of motor-transport development; all of which reacts unfavorably on the public purse.

Restriction of sizes and weights of trucks for the purpose of prolonging the life of uneconomic types of road, such as to prevent the operation of the most economical type and size of truck, will prove expensive to the public in the end for two principal reasons:

(1) The elimination of the heavy truck will not reduce the volume of transportation over the road, but will divert it to smaller vehicles in greater number; this will occasion a considerably higher transportation cost.

(2) The operation of this greater number of smaller vehicles at higher speeds and generally greater impact upon the road will result in more rapid road wear and will require, in time, the widening of the road to accommodate the large number of vehicles. The cost of a wider road of lighter construction may very possibly be greater than that of a narrower one of heavier construction.

The maximum economic efficiency, therefore, depends upon the adaptability of the road to a type of vehicle that is the most adaptable to the nature of the haulage work to be performed, operated in the most effective and economical manner. These considerations involve three groups of factors which can be termed highway efficiency, transport efficiency, and vehicle efficiency.

Highway efficiency consists of: (a) the adaptability of the road to the carrier, and (b) the adaptability of the carrier to the road. In other words, a highway may be efficient by reason of its appropriateness to prevailing types of vehicle or because the vehicles are adapted to its particular construction.

The adaptability of the road to the carrier requires that it possess the proper capacity, tractive resistance, grades, routes, curves and corners; in other words, it must be wide enough to permit the traffic to flow freely and without unnecessary delay. What width will best accomplish this end will depend naturally upon the types of vehicle making up the traffic and the volume of speed of such traffic. It must have a surface capable of withstanding the pressure of the tires and a structure capable of withstanding the impact occasioned by the passage of vehicles. It must be of such nature that the changes of condition with the seasons or weather will not interfere with its use. It must have a surface that produces a low tractive resistance, grades that are within the practical ability of the truck and a route calculated to give direct and easy access to the points that the truck must reach. Curves and corners must be such as to permit the vehicle to make turns without difficulty. The adaptabilty of the carrier to the road naturally depends upon characteristics of ability complimentary to the above specified elements.

A road that is narrow, soft and poorly drained, having steep grades and sharp curves, is naturally very poorly adapted to heavy tractors and trailers, the characteristics of which require a road of at least 16-feet width having a smooth, hard surface, a firm subgrade, good drainage, moderate grades and gradual curves wider than the straight portions of the road.

TRANSPORT efficiency consists of (a) the adaptability of the carrier to the volume and character of the load, (b) the comparative adaptability of motor transport to horse transport or railroad transportation, and (c) the adaptability of carrier to traffic conditions.

Again, the adaptability of the carrier to the volume and character of load depends upon the total load-units to be carried, the range as constituted by the maximum and minimum load units to be hauled per unit of time, the average load units per unit of time, the density of the load, the length of haul and its route, and the number of probable duration of stops for load.

By the term load unit is meant the unit by which the load is measured; such as tons for coal, cubic yards for sand, gallons for oil, thousands of board-feet for lumber, packages for department stores and cans for milk. The character of load unit and the kind of material or commodity that it represents determines the type of body best adapted to efficient haulage; and the maximum, minimum, average and total amounts to be hauled, together with the length of haul, determine the most economical size of chassis. The route and the number and probable duration of stops for load have a considerable bearing upon the type of equipment that is most economical; that is, whether a truck, a tractor with semi-trailer, a truck with full trailer, or a tractor-and-trailer train is most suitable; whether solid- or pneumatic-tire equipment should be provided; and whether gasolene or electric power should be used.

If the work involves a long haul over a route including soft and tortuous mountain-roads with few stops of short duration, the material being in units of packages of low density, the equipment is limited immediately to a light-weight, high-speed pneumatic-tired chassis having an inclosed or a screen-sided panel body equipped with means for readily taking individual deliveries. The equipment will naturally have

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to be gasolene-propelled, preferably provided with electric light but not necessarily with electric starting. If, on the other hand, the work involves the haulage of a large quantity of an exceedingly dense material of a non-fragile nature, in cubic yard units over only a few miles of reasonably hard and level road, with no stops for loads between terminals and subjected to considerable variation in the number of cubic yards to be transported per day, the most economical equipment is a heavy-duty chassis having a wide, flat, steel, mechanical-dumping body, with full trailers having similar bodies for use when the volume of work is particularly heavy.

In the consideration of horse transport practically every factor that is concerned with motor transport must be taken into account. In addition, the factor of public health will become more important. In connection with railroad transport the comparison with motor transport is limited to consideration of transport efficiency and economy. Moreover, railroad transportation must be judged also from the standpoints of the cost, delay and breakage incident to carriage over the streets at each end of the rail haul, and the extra packing, boxing and carting required in railroad transportation. In most cases it is not difficult to define the separate fields of efficient transport of the horse, the railroad, and the motor carrier. None of the three is capable of serving for all kinds of transportation efficiency. The field of motor transport lies in a ground between economical horse and railroad transportation. The adaptability of the carrier to traffic conditions depends upon how it conforms with state and local regulations, the average running speeds that are possible in prevailing traffic, and the degree to which it is adapted to bridges and ferries on the route.

VEHICLE efficiency is concerned with the comparative amount of benefit derived from the operation of the equipment for the amount of expense of one sort or another incurred by its operation, and can be expressed as the combination of effective operation, efficient maintenance and economy of cost.

Effective operation can be expressed as the combination of two factors; namely, the moving factor and the load factor. The former is simply the percentage of time spent by the truck in moving. The latter represents the percentage of load capacity that is constituted by the actual average load carried. The accompanying outline gives a few of the principal elements of operation that affect these factors. Thus, a truck can be considered to have a 100 per cent. operating efficiency when the wheels are turning every minute of the working day and it is carrying a full-capacity load at all times. Such a condition could rarely exist, but it is conceivable that a truck might be used in spreading road material in such a manner that it would receive its load from a traveling chute without stopping at the loading point, and would spread it on a road or yard surface while moving through the unloading point. Ordinarily, a moving factor of 60, representing 6-hour running out of a 10-hour day, and a load factor of 50, representing a 2½-ton average load on a 5-ton truck, are to be considered satisfactory operation.

Maintenance efficiency is expressed by a single factor; namely, the active factor, by which is meant the percentage of working days during which the truck is in commission. An active factor of 100 per cent. represents a truck in commission 310 working days in a 310-day year. Two classes of lay-up are commonly responsible for an active factor of less than 100 per cent.: namely, those due to disability of the truck and those due to conditions in the owner's business that render the operation of the truck unnecessary. An active factor of 100 per cent. is by no means uncommon among the better grades of chassis.

Economy, in the narrower sense in which it is used in connection with the outline, consists simply of the ratio between cost and earning. These are termed, respectively, the earning factor and the cost factor. Included in the earnings of a motor truck are all the benefits that accrue to the user by reason of its operation, including the savings effected over what his costs would have been by the next most suitable form of transport. The outline suggests only a few of these benefits, which must of necessity be of limitless variety in different installations. The cost factor is made up of two groups of expense; namely, the operating cost and the overhead. Included in the operating cost are the usual fixed maintenance and running charges, covered by the National Standard Truck Cost system, and under overhead are all other charges concerned with the business that arise from or are necessitated by the operation of motor transportation.

It is possible to derive some measure of the economic efficiency of a motor transport installation out of a combination of all these factors. These are the materials with which we have to work, the remaining problem in arriving at a conclusion being to evaluate and harmonize them in such a manner as to attain an equation in which all factors are in their proper proportion. To do this it is first necessary by experiment, research and calculation to base as many of these factors as possible upon definite determination of facts many of which are exceedingly obscure to-day.

Some of the principal subjects for needed research for the development of what can be termed the economics of motor transport are (a) highway engineering, (b) highway economics, (c) traffic investigation, and (d) automotive engineering. In regard to highway engineering, they are

(1) Safe tire-loads for various types of road construction.

(2) Safe total of axle-weights for various types of road construction.

(3) Impact resistance of various types of road construction.

(4) Tractive resistance of various types of road.

(5) Super-elevation of curves.

(6) Relation of necessary widening of road at corners to degrees of curvature.

(7) Types of bridge appropriate to various types of road.

(8) Necessary degree of surface smoothness to reduce impact to harmlessness.

Under highway economics are included:

(1) Construction and maintenance cost per mile of various types of road, pro-rated over the life of the road.

(2) Vehicle capacity of road per hour, under practical traffic conditions.

(3) Tonnage capacity of road, with various types of traffic, in reference to the speed and capacity of trucks.

(4) Proportion of highway and vehicle cost respectively to the total cost of motor transport.

In traffic investigation the need for a traffic census on important street and highway motor truck routes is great. Such an investigation should show not only the total number and types of vehicles traversing the road, but the load factor and speed under which they are operated and changes in volume at different periods of the day, all such data being collected at various times and at several points so that the following factors can be determined:

(1) Daily tonnage hauled over the route.

(2) Daily vehicle-mileage over the route.

(3) Average load per vehicle.

(4) Average miles traveled on the route per vehicle.

(5) Ton-miles per day on the route.

(6) Comparative ton-miles at different hours of the day and on different days of the week.

(7) Comparative ton-mileage at different times of the year.

(8) Comparative ton-mileage at different points of the route.

(9) A study of comparative costs of transportation by railway freight express and trolley express.

Such a study should contemplate the complete cost for different classes of material commonly hauled on motor trucks, including freight charges, trucking at the point of origin and destination, and extra packing costs.

Automotive-engineering research is desirable on the effect of grades, relative smoothness of surface and tractive resistance upon:

(1) Gasolene consumption.
(2) Speed.
(3) Drawbar-pull.
(4) Acceleration.

Work along these lines is in progress. The Bureau of Public Roads of the Department of Agriculture is spending $150,000 per year on road research and experiment. The various states and the National Research Council also are vigorously prosecuting work along similar lines. The Iowa Engineering Experiment Station, for example, has $10,000 per year to spend upon highway research, of which it is understood about $7,500 will be devoted to an economic study of highways.

The National Research Council, through its Committee on Economic Theory of Highway Improvements, under the chairmanship of Professor T. R. Agg, is conducting a series of tests at the Massachusetts Institute of Technology to determine some of the physical relationships between the vehicle and the highway.

Experiments begun by the Office of Pub-

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lic Roads, under the direction of A. T. Goldbeck, are being continued. Mr. Goldbeck, as chairman of the National Research Committee on Structural Design of Roads, is making a new set of tests on the Illinois experimental highway.

The $275,000,000 federal-aid appropriation for highways has not been spent by any means. It is estimated that the annual highways expenditure of the federal government, the several states, and the counties and townships within those states, amounts to $1,000,000,000 per year. As against this, motor vehicle owners contribute the largest single item, conservatively estimated at $316,720,878, of which $102,000,000 is in registration and license fees alone; and the amount being contributed by motor vehicle users in the form of direct taxation is increasing rapidly.

There can be no doubt that the principle of taxing the users of the highway for the privilege of making use of the public roads is faulty, especially when the basis upon which the tax is levied is unscientific and inequitable, applying only to power-driven vehicles in most cases, while permitting animal-drawn vehicles free use of the highway. Unquestionably the benefits of the highway extend to every citizen, irrespective of whether he operates a motor vehicle. This special taxation is inevitably passed along to the general public in the form of increased price of commodities. The practice is gaining impetus throughout the states. Texas has recently passed a law whereby motor trucks are taxed a certain amount per mile operated.

Acquiescence to this condition of affairs by motor vehicle users carries with it the right to demand a voice in highway councils to the end that the money shall be spent on types of highway construction that are economically suited to the transportation needs of the country. It is the engineers of the automotive industry who must lead in furthering the proper economic development of the highways and the development of motor-transport.

New Buick Delivery Car

The Buick Motor Company has brought out a special delivery car on a 4-cylinder chassis, with three types of bodies. The open express is priced at $945; the canopy top delivery with roll curtains at $965; the canopy top delivery with screen sides at $1,015, the panel side delivery with steel panels at $980, and the panel side delivery with vehisote panels at $1,005.

The bodies are especially designed for strength and rigidity achieved by the extra strong bracing and steel binding of panels, flare-boards and tail-gate. An additional reinforcement is assured by heavy steel angles running the entire length of the body along each side to form a side frame. The rear end is entirely sill-bound and scuff straps extend well into the body and bend over to join the reinforcement construction.

The vestibule has steel sash drop windows, which are cushioned to prevent rattling. The doors may be secured back for summer driving. The engine, starter, clutch and other units are identical with the 4-cylinder passenger-car chassis.

2½-Ton Truck Proves Much Cheaper Than Two Wagons

HORSES UNSUITED TO FREIGHT WORK

In nearly two years' operation our truck hasn't lost a single day for repairs, the only attention required being for minor troubles," says A. N. Phillips, president of the Central Ohio Supply Company, Columbus, Ohio. "It hauls our incoming freight from seven depots, and by its speedy and dependable service enables us to get our goods to customers as promised. This naturally has resulted in better satisfied customers and increased business.

"We are dealers in bakers,' confectioners' and ice cream manufacturers' supplies, and are the only concern of our kind in Columbus. We buy our goods in quantities, haul them from the freight stations to our warehouse and then resell them, usually in smaller quantities. Our warehouse occupies practically an entire building, having a floor area of over 22,000 square feet.

"The freight depots which the truck reaches regularly are from two blocks to one and one-half miles away, and we aim to call at each depot at least once a day. The loads usually consist of crates, boxes or barrels. Sometimes the truck is loaded both ways, when we are making a freight shipment out of town. It makes about three trips a day and carries four or five loads, averaging 2½ tons each. We don't believe in overloading.

"The truck operates for $10 a day with driver. It does the work of two teams, which would cost us at least $20 a day, so it saves over $2,000 a year on our freight hauling. It has stood up well in spite of bad road conditions, as shown by its repair bill of only $100 for two years' hard service.

"The truck has a good driver, who is very careful and catches small troubles before they become serious. He uses lots of oil and grease, and we believe it pays. On account of the excellent care given our truck—a Selden—we figure that it is good for 8 years. Of course, this means only about 28,000 miles, because it spends most of its time loading and unloading, and makes only short hauls.

"In spite of the unfavorable conditions encountered around the freight-houses, where the roads are unusually rough and deep ruts are the regular thing, repairs have been very low. Outside the few hours required for adjustment, the truck has operated continuously. We have had very little occasion to call on the local dealer for service, but when we have needed him we found the service prompt and efficient.

"Our regular city delivery work is handled by a 2-ton truck. When purchasing the Selden we chose a heavier truck as better adapted for freight work. Occasionally the larger machine makes deliveries to help out the other truck, and it has proved satisfactory on this type of work also.

"Because of our short hauls, it might appear that we should find horses more economical than trucks, but this is not the case. We abandoned horses for our delivery work five years ago, because they haven't the necessary radius. For our freight work they were unsatisfactory because they were not as fast as trucks and cost more.

"The speedy and prompt service given by the truck means quicker deliveries, better satisfied customers, a quicker turnover, and increased business. It would require at least two teams to handle this work, because they are slower and carry only one or two tons. The truck carries 2½ tons. We have loaded 3 tons on a team, but this is exceptional.

Trucks Aid Poultry Schools

Portable sheep and poultry "schools" built on trucks given by local people and conducted by extension workers employed coöperatively by the United States Department of Agriculture and the state colleges of agriculture went to the doors of homes and schools and to fairs in North Carolina and Texas last year. An itinerary was mapped out for each school and advertisements were sent ahead announcing the date and hour of its arrival at each place.

The poultry schools were decorated with appropriate banners and signs, such as "Kill the Scrub Chicken; He Will Eat His Head Off," "Remember the Poultry Show in September," "Produce Infertile Eggs," and "Swat the Rooster." A volunteer drove the truck. It was accompanied by several cars filled with poultry enthusiasts, giving the resemblance of a holiday parade. Eight coops of good birds, the best obtainable, were carried for illustrative purposes, and at each stop the home demonstration agent made a short talk on the merits of standard-bred poultry, while pamphlets on poultry were freely distributed to those desiring them.

For the sheep school a 16-foot live-stock body 8 feet wide was placed on the chassis. This was divided into two compartments with feed rack and trough built in with a partition. Eight pure bred sheep, representing the Shropshire, Hampshire, Southdown, and Dorset breeds were put into these. In addition sheep-shearing, wool tying, docking, and castrating equipment, wool samples, blankets, models of sheep barns, and other exhibits of interest to sheep breeders were carried

Large enthusiastic crowds greeted the school at each stop, and the interest of school children was especially noticeable. This type of school is not only bringing results but is demonstrating the need of more of such work so that information may be carried directly to farmers no matter how inaccessible the community may be, say officials of the department.

Purdue Will Study Trucking

Purdue University has agreed to coöperate with the Allied Motor Commerce throughout the State of Indiana in the work of analyzing the cost of operating motor trucks and horse-drawn vehicles. The university agrees to bear the expense of such an analysis and to place capable men from its road school department at the service of the Allied Motor Commerce to do the work. This will cover every element of city cartage, freight transfer, commercial delivery and intercity motor express.

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Heavy Trucks and Permanent Roads

By E. J. McCAUSTLAND
Dean, Engineering School, University of Missouri

WHAT is meant when the term "permanent highways" is used? The phrase is one frequently heard, but its meaning is not well established, since we find it used to convey quite different ideas under different conditions when used by different individuals. In fact, the term has become a mere figure of speech, since we know that no highway so far constructed has been found to be absolutely permanent; furthermore, if compared with other engineering constructions, a little consideration will show that we can not hope to attain anything more than a certain degree of permanence even with the best materials obtainable under any ordinary conditions of traffic. We can, however, choose for road-making purposes those materials best suited to the traffic the finished way must bear, so that depreciation charges may be kept to a minimum, at the same time maintaining a standard of 100 per cent. efficiency in the roadway at all times.

The permanency in service of a highway, as an instrument functioning in the problems of transportation, is limited by the stability of the foundation under repeated loadings and the durability of the wearing surface under the attrition of traffic and the effects of weathering. These are independent elements affecting permanency, although it is to be noted that the relative stability of the foundation affects to a marked degree the durability of the wearing surface. That is, a weakness in the foundation directly shortens the life of the wearing surface.

The foundation should be designed to carry, without injury, the greatest load that may be brought upon it. If the foundation yields even to a slight degree it is permanently damaged and an incipient failure of the wearing surface at once occurs. If the foundation actually fails, the road must be rebuilt so that it becomes practically a new structure. It follows, therefore, that, in case funds are limited, maximum effectiveness must be sought from all funds used in the construction of a foundation. That is, the foundation must be designed to carry the maximum load which may be allowed to come on the highway and legal restrictions should intervene to limit loads to that for which its foundation was originally designed.

It must be remembered that in the older countries, particularly in England and on the European Continent, the foundations for the present magnificent system of highways have been in process of formation for centuries. In this country the situation is entirely different. The railways have made possible the spread of the population over great areas and thus intensified and made difficult the problem of highway building. We have had neither the time nor the occasion to build up foundations for present lines of highway. For our present needs we must build from the very bottom and our subfoundations must be laid in the fertile soils of our vast areas of farming lands. It is not a figure of speech to say our problem is to "get out of the mud," while the current problem in the older countries is much simplified by a more gradual development of its territories over a period measured in centuries.

The second point which relates to the permanency of a highway is bound up in the character and quality of its wearing surface in relation to the traffic it must bear. If the foundation is good this wearing surface may be renewed again and again, and in the better types of development this method is used to maintain a high degree of efficiency in the highway as a unit in effecting transportation. While a satisfactory foundation may serve to support an indefinite number of wearing surfaces, the type and character of the material used in the construction of such wearing surfaces must be carefully chosen in view of numerous and complex variables such as present and probable future traffic, first cost of construction, annual depreciation and cost of repairs, as well as the ease and promptness of renewal. The last item particularly should not be overlooked since interruption of traffic may become very costly.

From what has preceded, it appears that the failure of highways to sustain the traffic imposed may always be charged to one or two causes. Either a faulty construction of foundation, or an improper choice of surfacing material. The foundation may fail on account of unstable soil conditions, bad drainage, frost upheaval, or overloading. All these causes are subject to investigation and susceptible to prevention within reasonable limits of cost. The skilled engineer may, therefore, design a road and its foundation for any probable condition of loading. It remains to devise and enforce regulations which shall prevent overloading, and this point will be discussed later.

The problem is not so simple when it comes to a choice of material for the wearing surface. It is always difficult to predict accurately the effect of traffic on a particular type of road surface. Much depends upon the character of vehicles used as regards method of propulsion and upon the magnitude of the load carried. These variables as well as the speed of traffic, width and type of tires and roughness of road surface may not be reduced to a formula and only experienced judgment is of value in reaching a final decision.

Much has been written and many investigations have been made regarding the effect of heavy trucks on road surface and on road foundations, but much is yet to be determined. It is found that the character of the vehicle and the relation between the sprung and unsprung weight which it carries has an important bearing on its effect as a destructive agent. These investigations are still being conducted and engineers are coming every day into possession of more and more reliable information which will help in forming correct judgment.

The general practice at the present time in a program of highway building is to study present conditions as relates to character and volume of traffic, make some estimate of future development regarding possible change in these particulars, and with this as a basis choose type and character of improvement; when a road so constructed is destroyed, rebuild to a higher standard and then again repeat the cycle of construction and destruction. Certainly a saner and more scientific plan of procedure would be first to make a careful study and estimate of future development from present conditions in reference to growth and character of traffic and to fix in advance the type and capacity of the vehicles that will be allowed to carry the traffic over the designated highway. When these points have been decided upon then design the road, having in view these fixed conditions, both as to foundation and wearing surface, and finally provide for adequate maintenance. The former method is clearly unscientific and a mere makeshift, while the latter gives opportunity for the application of experienced engineering judgment.

TO INSURE protection against wanton destruction of highways by excessively heavy trucks drastic legislation is needed. In 48 states there are no less than 17 different bases or combinations by which an attempt is made to secure such protection. However, this legislation generally takes the form of exacting fees based upon some one or more of the 17 items above mentioned. These are: horse-power, carrying capacity, weight (vehicle only), gross weight (vehicle and load), cost of vehicle, piston displacement, total tire width, weight of chassis, flat rate per vehicle, horse-power plus gross weight, horse-power plus vehicle weight, horse-power plus cost, horse-power plus capacity, weight plus cost, weight plus capacity, weight plus horse-power plus cost, weight plus horse-power plus cost plus capacity. Of the above items the Uniform Vehicle Law recommends horse-power plus gross weight.

The main purpose of these state laws apparently is to insure some return in fees from truck owners for the use of the roads. Some states limit loads, but in very few instances is there any attempt to classify roads on the basis of carrying capacity and refuse the use of any road to excessive traffic. To continue the attempt to build roads to carry any load that the truck owner may see fit to impose is to court financial ruin and to arouse bitter opposition on the part of the ordinary taxpayer.

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In the first place trucking, as such, is a business venture maintained and conducted primarily to return profits to owners of trucks. It is a business also which is, to some extent, in competition with the railways. In order to make possible a profitable business of trucking the public provides at great expense the way over which the vehicles move and this is done at no cost to the track owner. It is true, the public may receive some benefits in reduced freight and passenger rates, but even if these reductions are sufficient to absorb the initial expense of highway construction, such advantage is not evenly distributed, and becomes less so in case of rebuilding.[1] Good engineering practice can not justify the wastes that now exist in and are inseparable from the custom of building roads for a traffic which is too destructive of them and which soon demands further expenditure.

At the end of the year 1920 the U. S. Bureau of Public Roads reported a registration of 852,362 motor trucks. There were produced during 1920, according to the National Automobile Chamber of Commerce, 322,039 motor trucks as shown in the following table:

Capacity in Tons.	Number.	Per Cent. of Total.
¾	61,187	19
1	164,240	51
1½	35,424	11
2	25,763	8
2½	12,871	14
3½	12,893	4
5	6,441	2
Over 5	3,220	1
Total	322,039	100

It is to be noted that the 1-ton truck is the prevalent size, constituting 51 per cent. of the 1920 production; that the 5-ton truck constitutes only 2 per cent. of the total output; and that trucks exceeding a capacity of 5 tons represent only 1 per cent. While the number of large capacity trucks is comparativey small, costly damages to road surfaces can be done by only a few of these large units.

As to the future trend of laws governing truck traffic it is impossible to predict; I will venture a suggestion, however, that will challenge some consideration. Laws are but an expression of the crystallized and formulated sense of right and justice on the part of the people; fair-mindedness and a comprehensive view of the whole problem of transportation is demanded of road-builders, the public and the vehicle manufacturer and user; coöperation must be the key-note, but no coöperative agreement can be hoped for until all parties in the case are enabled to see the problem from the point of view of his fellow as well as from his own. I believe the tendency in the near future will be toward more uniform regulating laws throughout the United States and toward a more rational basis upon which to formulate such laws. Truck builders and operators are helpless without roads; roads built ready for traffic are useless without vehicles; and the public depends upon both for service.

[1][For some unstated and not at all obvious reason the author has seen fit to distinguish between truck owners and the public in explaining where the burden of road-building cost falls. The truck owner not only pays the pro rata share of road costs which is allotted to him as a member of the public, but he is taxed on his vehicle as personal property in many states and pays, in addition, a heavy license fee for permission to use the roads. The author seems unwilling to believe that the benefits of improved highways are enjoyed by the public at large, although it should be apparent to anyone that the gains thus arising can not be absorbed entirely by the operators of highway vehicles. Are the advantages of economy, celerity and dependability to count for naught? If so, we fear the advance from the ox to the railway must be of very doubtful public value.—Ed.]

Who Maintains the Railways and the Highways?

By F. R. FAGEOL
General Manager, Fageol Motors Company

MUCH has been said and written about the relative costs of transportation, either passenger or freight, over railroads and by motor trucks. As truck manufacturers we wish to admit that we do not believe that motor trucks will ever transport either passengers or freight as cheaply as do the street-railway companies and the railroads, but we do not believe the question of cost really enters into or is a part of the consideration. The great consideration is convenience.

The progress of the world has been marked not necessarily or primarily by a reduction in first costs, but rather by ways and means that create greater convenience; greater convenience, on the whole, tending toward higher standards of living, more industry, and more prosperity for everyone concerned. By way of a few simple illustrations:—No man ever rode from his home to his office in his automobile cheaper than he could have ridden on a street-car. But the cost was not a consideration; it was convenience. It would be cheaper to heat water in a teakettle, pour it in the washtub and take a bath in that manner (as they did in the olden days) than it is to spend a lot of money equipping a house with plumbing, bathtubs, etc. But no one seriously considers doing this, because the bathtub is more convenient. And so on, indefinitely. Show me a land inhabited by a people who do not know or do not care about convenience and where everything is extremely cheap, and I will show you a non-progressive, backward people.

I quote the results of some very interesting figures, compiled recently by E. V. Buckwalter, covering traffic conditions on highways versus railroads between Pittsburgh and Bedford, Pennsylvania. Condensed, these figures show that there were 6,000 people per hour being transported by motors over the highway as against 4,400 people per 24 hours via railroad. Considering that the railroads were operating only 12 hours—which time covers the dense travel on the highway—they would be transporting approximately 360 people per hour. In other words, on account of convenience, wherein cost is of no consideration, there are as many people being transported by motor-driven equipment over our highways every 3½ minutes as there are over the railroads every hour. And, it is our opinion that the great tonnage of freight will, in time, be transported in about the same proportion.

The railroad companies have during recent years indulged in a great deal of talk to the effect that they were being discriminated against by motor truck operators and treated very badly in general.

The railroad companies contend that they maintain their own railroad tracks and rights-of-way, and that the general public keeps up the highways over which motor trucks and busses travel. It is my contention that these claims are based largely on false reasoning, in that the general public—the consuming public, you, I, and everyone else—maintains all railroads and all highways, and all of everything commercial that exists, and, if the railroads do not derive their revenue for keeping up their rights-of-way, etc., from the general public, just where do they get it? They must have found an ever-flowing fountain of gold and have guarded their secret well. The public really maintains the railroad rights-of-ways and all of their equipment by a direct tax in the form of freight on every article it purchases, whereas it partially maintains our great highway system by a direct tax on all articles transported over them and through the indirect tax which they pay on property, motor licenses, and otherwise.

The great point is that the consuming public must pay for everything, the money can and should come from no other source. As to just how it pays matters little. However, if we are going to work on the theory of letting the man who can afford it pay most, then they certainly come nearer doing it in the maintenance of the highways than they do when paying for the maintenance of the railroads, as the highways, at least, are largely kept up by the tax on property owners and those who use them most, whereas railroads are kept up by direct tax in the form of freight on everything one consumes, handles or wears that has ever been transported over a railroad.

We should not assume from this that we have any quarrel with the railroads; far from it. We greatly admire them, feel that they have in the past and always will fill a great need, and feel that the ever-increasing use of motor trucks, passenger-cars, etc., will probably mean that in future we will have to pay more direct tax on articles which railroads haul than we have heretofore, as an ever-increasing volume of their business is going to travel over the highways instead of over the railroads. The railroad and street-car companies must recognize this situation and the demand of the public for more convenient service without regard to cost (within reason) and they must start to provide that service. At such time we shall see railroad stock and railroad revenues go to the level where they belong.

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England's Proposed New Motor Transport Regulations

By OBSERVER

THE second interim report of the Departmental Committee on the Taxation and Regulation of Road Vehicles of England has appeared and its recommendations are put forward with the proviso that the Ministry of Transport should have wide powers to vary any regulations in the light of experience. It is, of course, to be understood that the report is only temporary, the intention being to supersede it with a final report later on, and for that reason some important questions, such as road classification and the licensing of motor coaches, hackney and stage carriages which depends on that, have not been touched on.

In general the recommendations provide for the consolidation of the motor law, increased weights and speeds for single vehicles, increased weights and speeds for heavy pneumatic-tired vehicles, increased weights and speeds for trailer traffic, the removal of speed limits for the lighter class of vehicles, severe penalties for reckless driving, spark-arresters for steamers, and that the police should observe the spirit rather than the letter of the law. In greater detail the principal provisions follow:

Mechanically-propelled vehicles are classified under six headings: (1) Locomotives; (2) heavy motor cars, including tractors; (3) motor cars; (4) motorcycles; (5) agricultural tractors; (6) exceptional vehicles. Vehicles of the first class do not fall within the scope of motor transport.

A "heavy motor car" is one not exceeding 7¼ tons unladen weight nor of less than 2½ tons unladen weight. A "motor car" is any vehicle weighing unladen 5,600 pounds or less, though, if it have less than 4 wheels, the limits are between 896 and 5,600 pounds. A motorcycle is a vehicle with less than 4 wheels and not weighing more than 896 pounds unladen. It is suggested that the term "agricultural tractor" shall include all tractors specially constructed for use on the land and employed in connection with agriculture, not weighing more than 3½ tons. All mechanically-driven road vehicles not coming within any of the other five classes would be termed "exceptional vehicles," and under this heading at present 6-wheelers (tractors with semi-trailers) and road trains would be included. No definite regulations for them are contained within the recent report; it is merely suggested that the Minister of Transport shall be empowered to make regulations governing them as circumstances and developments arise from time to time, and to authorize the road use of any such machines for special or experimental purposes.

Of all the recommendations in this latest report, unquestionably those of most interest to motor transport people govern speeds and weights. These would raise the unladen weight of the lighter as distinct from the legally heavy cars by half a ton, leaving in the latter class all of over 2½ to 7¼ tons unladen weight. This half-ton increase for the lighter cars, if made law, will no doubt be due to the fact that at present a number of private cars already well exceed the 2-ton weight, and this raising of the weight limit will be analogous to the increase of the heavy motor car maximum unladen weight from 5 to 7¼ tons a few months ago.

And in conjunction with this increase the removal of the 20 miles per hour speed limit is proposed for all pneumatic-tired cars of the lighter class, though for vehicles with solid resilient tires the committee favors the retention of the existing 20 miles an hour limit.

Moreover, whereas vehicles coming under the 1903 Motor Car Act have hitherto been unrestricted in the size of trailers, without decrease of speed, it is suggested in the report that, unless the trailer is "rigidly connected to the towing vehicle so that it is incapable of lateral movement or overturning, except in conjunction with the vehicle to which it is fixed," even this speed limit of 20 miles should be restricted to cars drawing small, 2-wheeled, pneumatic-tired trailers not weighing more than 336 pounds, nor projecting more than 7 feet behind the towing vehicle, or exceeding the overall width of the towing vehicle. With trailers not complying with these conditions, a speed limit of 16 miles an hour is advocated for light motor cars. Thus in the lighter class the present single restriction of 20 miles per hour would be substituted by four different speed maxima.

Hitherto also the law has put no weight limit on trailers used with the lighter class of cars; practical considerations have been sufficient. Now, a loaded axle maximum of 1 ton as well as compulsory pneumatic or solid resilient tires are advocated for this lighter class.

It should be noted that the carriage of passengers on trailers in all classes of motor cars is to be banned. Under existing laws this is only illegal for heavy motor cars; vehicles not over 2 tons unladen may, strictly speaking, draw passengers in trailers.

For vehicles that are being towed by ropes, a regulation is devised limiting the distance between towing and towed vehicles to 10 feet between their nearest points.

For the larger vehicles coming within the Heavy Motor Car Order, it is thought that no unladen weight limit of trailers need be prescribed, but laden, it is proposed the total trailer weight shall not exceed 14 tons, nor axle weight 6½ tons; so the possibilities of trailers with more than 4 wheels are thus very definitely curtailed. A loaded 4-wheeled trailer could not weigh more than 13 tons, while 14 tons would be the limit however many axles were used on the conveyance.

In the heavier class it is important to note the recommendation that, though tractors should be restricted to one laden trailer, they might be allowed to haul two unladen.

The use of more than one trailer with long indivisible loads is covered by two recommendations which would allow special concessions in weight and wheel diameters in the case of two 4-wheeled bogies if used.

In the light of these statements, the accompanying table gives in condensed form all the regulations governing weight and speeds for different classes of vehicle.

Unquetsionably, the two most important of these recommendations are the abolition of the speed limit for pneumatic-tired cars weighing unladen 2½ tons or less, and among heavy cars the introduction of a special speed limit of 20 miles an hour for those up to 3¾ tons unladen weight fitted with pneumatic tires. And there is a further recommendation that the Minister of Transport should have power to authorize a speed of more than 16 miles an hour for pneumatic-tired cars with axle weights of over 4 tons "if and when he is satisfied that pneumatic tires adequate for this purpose are available."

In addition, certain regulations are proposed for wheels and tires. For resilient tires other than pneumatics on all cars, whether light or heavy, a maximum size of 670 mm. is suggested; for non-elastic, *i. e.*, metal or wood block tires, no alteration on the sizes already laid down by the Heavy Motor Car Order is advised.

Under the heading of "left-hand drive" the opinion is expressed that the driver, wherever he sits, should be able to give proper traffic signals from a defined position, with a minimum diameter of 2 feet 9 inches.

On brakes two recommendations are made: first, that more onus for maintaining them efficiently be placed on the owner; and, secondly, that the police should have powers to examine brakes on all vehicles.

Further recommendations affecting the construction of vehicles include (1) one in favor of all vehicles not fitted with proper running boards or their equivalent, if entitled by law to speeds of over 12 miles an hour, being fitted with guard rails; (2) that those vehicles which prevent the driver from readily hearing or seeing overtaking cars should be provided with mirrors or sound-receiving devices; (3) that steam-driven vehicles using solid fuel should be fitted with spark-arresters; and (4) that cylinders containing compressed gas for transport purposes should be certified and stamped, and only used under special license from the Ministry of Transport.

The proper illumination of back number plates, it is also held, should be more frequently enforced.

For agricultural tractors a speed of 4 miles an hour is suggested, unless the machine complies with all the requirements governing some other class of vehicle and is fitted with springs back and front. In this case it might travel at the speed appropriate to the class into which it falls, "but not exceeding 16 miles an hour." Nevertheless agricultural tractors would not necessarily have to be spring mounted.

A diameter of 36 inches for driving-wheels of these machines is recommended as a minimum; a 24-inch diameter for other wheels, and for metal tires a width of 1 inch for every 336 pounds of load on the

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wheel. Steering bands on front wheels should not be less than 2½ inches wide, strakes 3 inches, with a maximum thickness of or negligent driving be extended to all mechanically-propelled vehicles, and that penalties for reckless driving should be increased. Very severe penalties are recommended for reckless driving, or for driving after disqualification or when the license has been suspended. For the former on the first offence a fine up to $250 is mentioned, with the added possibility of the driver being disqualified from holding a license or having his license suspended; for subsequent offence a fine not exceeding $500 or imprisonment up to six months. For driving when disqualified or when a license is suspended, even for the first offence, imprisonment up to twelve months without the option of a fine is suggested, with hard labor at the discretion of the court.

In the case of merely technical offences, it is held that the police should consider the object of the regulation broken, and avoid regarding a mere breach as being an offence in itself.

Notice of intention to prosecute for reckless driving should be given with the least posible delay. If a summons cannot be served within 28 days the police should give notice, by registered post, to the owner of the vehicle, or their intention to prosecute, but should the magistrates be satisfied that the police have used all reasonable diligence to ascertain the registered owner, they should have power to waive this 28-day limit.

It is proposed that official inquiry should be held in serious road accidents when fatal, or when alleged due to defective roads or vehicles. For these the police would notify the divisional road engineering officer, who would in turn notify the Ministry of Transport. The latter might then authorize a public inquiry, at which witnesses could be compelled to attend and give evidence on oath. For each inquiry, a special order would be required, and the expenses would be defrayed out of the Road Fund. Should the proprietor of a vehicle desire, he might invite an inquiry. These investigations would be the subject of a report to parliament, or might be included in the general annual report of the Roads Department.

To check weights the committee favors an alteration to the existing law so that the police may be empowered to require a vehicle to be driven as much as 1 mile for the purpose of testing its axle weight, or over 1 mile subject to compensation if the axle weight is not exceeded. No unloading should, however, be required to test unladen weight. For those who habitually exceed legal axle weights it is thought that the courts should have power to impose a heavier penalty than the present maximum of $50.

In view of the recent Weston-super-Mare case the recommendations, on extraordinary traffic will be followed closely. Briefly, they are that, if traffic is recognized by both parties as extraordinary before it commences, an agreement between the two parties for strengthening the road and apportioning the cost is desirable, and, failing such agreement, some independent authority should settle the terms. Further, that any road authority or user may apply to the court to appoint a person to inspect a road and report on it before any such possibly extraordinary traffic uses it, during its continuance, or after it has ceased.

One or two items in the report affect the public in their relations to motor traffic rather than motor traffic in relation to the public. One of these is contained in the suggestion that it shall be considered an offence for any unauthorized person to enter or tamper with a mechanically-propelled vehicle standing on a highway, and another recommends that any person who rides or is towed by a vehicle without the consent of owner or driver should be liable to a penalty up to $2.50 for the first offence and $10 for each subsequent offence.

Finally, it is suggested that the Minister of Transport should have power to acquire land and vehicles for testing the latter and experimental road lengths and bridges; also to divert traffic for data tests.

An important reservation is included at the end of the report. While agreeing generally that the "recommendations should be considered as largely inter-dependent," the author of the reservation considers that certain of them are necessary in themselves, quite apart from other proposals. Among these, particular reference is made to the proposals relating to brakes, those concerning the issues of licenses to physically unfit drivers, and the proposed increase of penalties for certain serious offences.

Though willing readily to assent to a substantial increase of the speed limit, he disagrees altogether with its abolition for motor cars and motor-cycles, and regards as too generous some of the proposed increases for the heavier types. In his opinion the time is not ripe for such a drastic change as the removal of the speed limit, and, if carried into effect, this would, he is quite definite, be attended by the most unfortunate results, however great the penalties were against dangerous driving and kindred offences.

With the recommendation that all vehicles with less than 4 wheels and not weighing less than 896 pounds unladen should be classified as motor-cycles, and, therefore, be enitled to carry half-size number plates, he also can not agree. Further, he is satisfied that the size of motor-cycle identification marks should be increased.

To Standardize 'Buses

The Engineering Committee of the American Electric Railway Association has drawn up tentative plans for standard motor 'bus construction. Proposed dimensions for the three sizes of chassis are:

Number of passengers	21	25	29
Wheel-base (inches)	156	176	196
Engine (horse-power)	30	40	50
Track, front and rear (inches)	66	66	66
Capacity of rear (tons)	2	2½	3
Braking surface (square inches)	150	175	200
Approximate maximum weight (pounds)	4,500	5,000	5,500

Other recommendations are:

(a) Low-hung type of chassis frame with a maximum frame height of 26 inches, preferably lower.
(b) Spring suspension.
(c) Engine preferably of either poppet- or sleeve-valve type with maximum speed not to exceed 1,300 revolutions per minute.
(d) Gear ratio not to be less than 7 to 1 and not more than 12 to 1.
(e) Metal plate or spoke wheels.
(f) 34-inch solid or semi-solid tires pneumatics where low floor height is not desired.

The State of Utah recently awarded road construction contracts totaling about $950,000. One of the contracts was for the longest stretch of hard surface pavement yet to be let in one job in the state, about 15.5 miles.

Maximum Unladen Weight. (lb.)	Maximum Seating Capacity.	Maximum Axle Weight. (lb.)	Car Tires.	Single or Trailer.	Maximum Trailer Weight. (lb.)	Trailer Tires.	Maximum Proposed Speed. (m.p.h.)	Maximum Speed Under Existing Law. (m.p.h.)
			MOTOR CARS.					
5,600	9	5,600	Pneumatic	Single	.....	.....	Unrestricted	20 up to 2 tons, 12 over 2 tons, unladen weight.
5,600	Unrestricted	Unrestricted	Soft solid	Single	.....	.....	20	ditto.
5,600	Unrestricted	Unrestricted	Soft solid	*Trailer	336	Pneumatic	20	20 up to 2 tons, 5 over 2 tons, unladen weight.
5,600	Unrestricted	Unrestricted	Pneumatic	Trailer	2 240	Soft solid	16	ditto.
5,600	Unrestricted	Unrestricted	Soft solid	Trailer	2 240	Soft solid	16	ditto.
			HEAVY MOTOR CARS.					
8,400	Unrestricted	8,960	Pneumatic	Single	.....	.....	20	12
8,400	Unrestricted	8,960	Pneumatic	Trailer	4,480†	Pneumatic	16	5
8,400	Unrestricted	8 960	Pneumatic	Trailer	4,480†	Soft solid	12	5
8,400	Unrestricted	8,960	Pneumatic	Trailer	31,360†	Soft solid	8	5
12,320	Unrestricted	14,560	Soft solid	Single	.....	.....	16	8
12,220	Unrestricted	14,560	Soft solid	Trailer	4 480	Soft solid	12	5
12,320	Unrestricted	14,560	Soft solid	Trailer	31,360†	Soft solid	8	5
16,240	Unrestricted	17,920	Soft solid	Single	.....	.....	12	8
16,240	Unrestricted	17,920	Soft solid	Trailer	4,480	Soft solid	12	5
16,240	Unrestricted	17,920	Soft solid	Trailer	31,360†	Soft solid	8	5
16,240	Unrestricted	22,400	Soft solid	Single	.....	.....	8	..
16,240	Unrestricted	22,400	Soft solid	Trailer	31,360†	Soft solid	8	..

All cars fitted with hard or metal tires, or drawing trailers fitted with such tires, are restricted to a speed of 5 miles per hour.
*These trailers must also not project more than 7 feet behind their tractive vehicle, and their overall width must not exceed that of their tractive vehicle. †Maximum axle weight, 14,560 pounds.

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Truck Overloads and Road-Building

By J. G. McKAY
Professor of Economics, University of Wisconsin

HIGHWAY design must necessarily be based upon traffic, and the behavior of the various details of design observed under different ranges and types of traffic. Highway transportation is in a condition of flux. An immense growth may be anticipated in the next decade. Our rapidly growing mileage of completed highways, with the prospect of continuous increase each year of construction programs, emphasizes the urgent need of road information upon which to base sound, economical road-building policies, that we may avoid the mistakes and disasters of unwise financial methods and unsound construction policies. The solution of engineer problems of design, maintenance and the like depends largely upon the character of the traffic, its speed, and the unit loads the highway must carry. The true purpose of an improved highway is a high degree of transportation service at the least possible cost to the public and road user. Clearly a traffic census is not a panacea, but I insist that without a knowledge of the actual traffic, speed, type, and weight of a given area, we are working in the dark. The actual traffic in terms of volume, density, speed and unit weights, must be correlated with laboratory and experimental impact tests as a guide to rational design. Independently each type of research is valuable, but the true worth of both can not be realized until combined—in other words, interpreting results of laboratory experiment in terms of vehicles on the highway.

Our state and national investment in highway systems is constantly increasing. The investment in motor vehicles and the automotive industry is growing steadily. A careful analysis must be made of the chief traffic elements responsible for increased construction and maintenance costs before the enactment of legislation which may, while protecting the highway, prove injurious to the growth of a highway transport service and detrimental to the automotive industry. We must be certain of our facts before we limit the traffic which may pass over any given highway. The limitation of wheel and gross loads must be based on definite information. The rapid destruction or ruin of gravel or macadam, and even concrete construction under heavy traffic does not necessarily mean that the construction of more durable pavement types is essential. It is conceivable that the heavy freighting vehicle is not an economic unit load, and that ultimately a smaller unit will become the maximum.

In making comparisons of the economies of the different methods of freight movement we are prone to make comparisons on the basis of operating costs alone. The true haulage cost must be based not only upon the cost of operation of the vehicle, but also a portion of the cost of building and maintaining a highway for the movement of vehicles, and must be included as a cost charge. Naturally this cost increases rapidly as the unit loads increase. Saving in transport costs may occur when heavy vehicles operate, reducing the freight costs by a few cents per ton-mile. On the other hand, a decided economic and social loss arises when new roads must be built or maintenance costs are excessive due to the utilization of the highway by heavy vehicles. The savings in operating costs of a few cents per ton-mile are more than offset by the heavy construction and maintenance charge. It is not alone a question of cost, but the road is out of service, which is even more serious.

It may be that an increase of the tire width to carry the freight load without destruction of the pavement is the solution. It is possible that the tire equipment should be capable of carrying the entire load, as suggested by Otto Armleder. This would solve the problem of overloading on the rear axle, but would not reach the problem of the total unit weight on the pavement, or overloading on the front axle. A study of the comparative economies of 3-, 5- and 7-ton trucks with regard to highway construction and maintenance, vehicle operation costs, and service time, would settle this controversial point and determine the maximum economical load unit.

To-day we see a strong tendency in the direction of restrictive legislation limiting the total loads which may pass over our highways and bridges. The classification of a highway system which limits the gross weight to 12½ tons on a very small percentage of the roads of a state, and to 7½ tons on the balance of the state system, definitely limits the manufacturer of trucks to a limited area for the sale of heavy vehicles. It is to his own best interests to coöperate in the solving of this difficult problem in order that his market may not be restricted beyond reasonable limits. The establishment of weight limits per inch of tire width must be based on conclusive evidence and research.

The manufacturer of trucks can not afford to design and market vehicles which unduly increase the cost of construction and maintenance of our highways. The highway engineer can not afford to build roads that will cripple or limit unduly the hauling capacity of trucks. There is a joint enterprise, a movement of the maximum traffic at a minimum cost, and upon its successful solution rests the welfare of both the public and the vehicle manufacturer.

It is an open question whether or not the ultimate sphere of motor truck operation is to be competitive with or supplementary to our existing transport system. The consideration of this problem carries with it far-reaching consequences, beyond the mere comparison of the cost of movement of freight by one or the other type of carrier. The movement of freight is by nature monopolistic, and does not permit of true competition. Either one or the other type of transport will occupy the field. The junking of our railroad investment would involve the destruction of property rights representing approximately one-twenty-fifth of our national wealth. We must consider the relative difference in the investment, comparing a large railroad system, with strict governmental regulation of rates and service, with fleets of motor vehicles in which the investment of the owner is small, with an absence of rate regulation or guarantee of service. The railroad investment is permanent and can not move to an alternative field, it must operate or become a loss. The commercial motor vehicle operator, however, may move to alternative fields when profits fail. This naturally would endanger the guarantee of freight service which is more fundamental a question than cost. It is difficult to conceive of the movement of heavy freight of low value by truck transport. The cost of moving such products as coal and iron, practically limits the truck field to high value and low bulk goods. Can the railroads operate profitably moving the low value and large bulk commodity goods on the short haul, while the profitable business is absorbed by the motor vehicles? Any comparison of the two types of transport with a view of selection of the more economical type involves a comparison of costs. In such an analysis we must not forget that the cost of construction and maintenance of the roadbed in both cases is a part of the charge which must be made against the freight moved. A proper share of construction costs and maintenance costs of the highway must be paid by the truck operator, before a real comparison of rail and truck rates can be made.

A CLEAR analysis of all the factors involved must be made before we can determine whether the field truck operation as a carrier is to be the competitive or supplementary to existing transport systems.

Unprejudiced research is fundamental in the attempt to solve these many difficult highway problems. Supply definite information to the highway engineer with the assurance that the type and weight of traffic will not change over night, and he will build safely and permanently roads able to carry the traffic at a cost not exceeding the service value of the highway to the community. The vehicle manufacturer in all fairness is entitled to know the facts upon which he must design and build trucks which will meet the requirements of a constantly increasing highway legislation.

In approaching an analysis of some of the factors involved in highway construction and maintenance, and motor vehicle movement a clear picture of the traffic passing over a given highway is essential

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to a thorough understanding of the type of construction necessary for traffic of a given type, giving at the same time a definite idea of the regularity of motor vehicle movement, density, weights and produce.

A TRAFFIC census may be defined as "a complete summation of traffic passing over the highways of a given area during a definite period of time." Every traffic census has certain limitations and a traffic census based on the following plan has the following limitations:

1. A certain portion of the traffic over newly completed roads consists of "attracted" traffic from other routes and does not represent the true traffic which will ultimately pass over the particular highway observed. Allowance must be made for a redistribution of traffic when parallel highways of the complete system are constructed.

2. We can not expect that a summation of vehicular movement will accurately portray future traffic. To obtain a picture of future traffic the census must be taken at given intervals over a period of years to determine the percentage increase of each vehicle type. The potential traffic of a given area to supplement the actual traffic census may be obtained by a survey of the agricultural and industrial growth of the community.

3. Only in a general way will the census data answer the question of the influence of various types of traffic on the highway without maintenance studies of the same road, correlated with impact studies. To be able to interpret correctly the weight and volume data, accurate maintenance cost studies are essential. It is advisable in the selection of traffic census stations to place them on highways on which maintenance costs of the various types of pavement are kept.

4. The tonnage volume, and weight per capacity of various vehicles will be of more value when combined with impact studies showing the effect on different types of pavements by impact tests. Being given the result of impact studies on the several road types, produced by the different vehicles, as shown by the census, the construction enginer can be assured of the type of highway he must build to carry the traffic. This will prevent over- or under-construction with the economic wastage occurring in either case.

In the past, traffic censuses have been taken by state highway departments largely for the purpose of determining the number of vehicles, passengers and types to indicate numerical movement. Generally such survey occurred during density of movement and for short periods of time. In a few cases the period of the survey was longer, while in one case actual weights were recorded.

In the belief that the expense of taking traffic census should produce more than surface results, and that the importance of the problems involved call for definite information, the following outline of traffic census is evolved. The main purposes of a traffic census may be summarized as follows:

1. An aid in determining the economic value of a highway. Three principal factors enter into the valuation of a highway improvement. The increase in land values, highway service value in terms of passenger and freight ton-miles, and the general value to a community. The only method of obtaining passenger and freight ton-miles is by means of a traffic census for a definite period translated into yearly traffic.

2. Classification of vehicular traffic. A classification of traffic of the several types is useful in formulating traffic regulations, and to some extent in determining the percentage source of revenue from highway users in accordance with their actual use of the highway.

3. To determine gross truck weights and overloading per truck capacity. Weight and speed are guides to design, pavement selection, limitations of grade and alignment. The facts as to overloading per capacity can only be determined by a knowledge of front and rear axle distribution of weight in terms of loads per inch of tire width. It is not merely a problem of loads beyond a given maximum, but the real difficulty lies in overloading beyond truck capacity.

4. Distribution of construction and maintenance funds. To distribute maintenance and construction funds in a fair proportion to traffic we must know the volume and type of traffic on the different highways. The greater the volume of traffic, logically the greater the percentage of construction and maintenance funds allocated.

5. To determine traffic density and truck body widths. The "peak" of traffic hourly, daily and during the season is essential. "Peak" density and speed influence width of pavement and determine the maximum width necessary to carry the "peak" load. A direct ratio exists between vehicle body widths and pavement width. Pavement width increases with the increased speed movement of the vehicle, particularly when the load is heavy. Seasonal and yearly traffic volume and density enable a prediction in a general way of future traffic.

6. To determine the vehicular movement of freight. Information as to regular and irregular trucking lines throws light on the proportion of regular freight movement. This is particularly valuable in the industrial states of the east and northeast. The average length of haul of commercial freighting indicates the field of competition of the truck and the railroad, whether the short or long haul. The type, volume and value of commodities moved indicate the commodity competition and the percentage of high value and small bulk freight moved as compared with low value and large bulk freight. The average delivery time indicates the rapidity of movement of commercial freight service. Information relative to truck operating costs and freight rates does not properly lie in the field of a traffic census, but must be made through independent studies.

7. Average speed of vehicles. These data must necessarily be obtained at the same time the census is recorded to check each vehicle observed in the speed test with the data obtained at the census station. The recording of the license number in each case permits the determination of capacity and weight. This information is useful in the formation of speed regulations and their enforcement.

8. Basis of the formulation of traffic regulations and their enforcement. The information as to weight, overloading, tire condition, body widths and speed not only afford a reasonable basis of traffic regulation, but are the data upon which enforcement depends.

With those purposes in mind a comprehensive study of highway traffic was conducted in the State of Connecticut during August and October of 1921 by the Connecticut Highway Department in coöperation with the Bureau of Public Roads. This survey consisted of two traffic censuses conducted on two of the principal highways of Connecticut according to a plan I had outlined as the basis of a model traffic census, and was put into operation by Highway Commissioner Bennett of the State of Connecticut. Each survey covered a period of two weeks, and included two night surveys to determine the percentage of night movement. Scales were installed by the Connecticut Highway Department on the roadside by means of which the actual weights of trucks were obtained.

AS I HAVE already suggested, the production of highways and of vehicles which utilize our highways represent two industries in which the yearly investment exceeds by far any other two industries in the United States. The past few years have witnessed a tremendous growth of new highway construction and the volume and types of vehicles using our roads. The interests of the highway engineer and the producer of motor vehicles are largely the same: the one to construct and maintain highways which will carry a maximum of traffic and economical weight units at a minimum cost; the automotive manufacturer to produce vehicles which will move the traffic at a minimum cost and with the least damage to the highway. We can not afford the waste of building roads to carry all types of traffic and unlimited loads, nor can we fit the vehicle to all types of highways. It is a combination of both, the building of suitable and satisfactory roads, and motor vehicles of the proper construction and weight. This is a joint industry of the road maker and the road user with a common object, the production of transportation at a minimum cost.

Naturally in any industry, whose growth has been as rapid as the development of our hgihway system, abuses arise. Difficult problems develop upon whose successful solution rests the continued support of public approval. We have at present in the highway industry many unsolved problems of highway economies and engineering which require immediate consideration. Intricate problems of finance, transportation, variation, construction and maintenance are a constant challenge to research in the field of high economics. This is a major field of operation and calls for the coöperation of all people interested in seeing the creation of permanent and continually usable roads at minimum expense.

One of the most serious difficulties confronting the highway engineer to-day is the construction of roads which will remain in existence long enough to justify the investment, and at the same time withstand the

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hammering of the steadily increasing volume of weight to which the pavement and subgrade are subjected. This presents a twofold problem. First the problem of excessive loads above a given maximum weight which results in the premature destruction of the highway. In 1920 only 1 per cent. of the motor trucks manufactured were over 5 tons capacity. The California Highway Commission in a recent statement says: "As the ratio of use must be in close proportion to the ratio of production, it follows that only about 3 per cent of the vehicles using the California State Highways are the so-called heavy-duty type. Highway construction, like any other governmental activity, is based on public necessity and this necessity should be met reasonably when highways are built, adequate to sustain 90 per cent of the traffic. This percentage would include all motor vehicles including the 2-ton capacity. Assuming $30,000 per mile as adequate to sustain 90 per cent. of the vehicular traffic of the state and $50,000 per mile to construct a highway which will sustain the weight required by 10 per cent. of heavy duty trucks, should the general taxpayer be required to invest an additional 66 per cent. in road construction for the primary benefit of this particular call of heavy vehicles?"

We must fully recognize the necessity of automotive transportation and the need for construction which will carry modern traffic, but first we must determine the economic load units, and, second, eliminate overloading. The weight of single units and speed are two essential points of difficulty. The greater the speed of heavy loads the more damage to the highway. The ratio of damage to the road with an increase in speed is altogether out of proportion to the economies gained by faster movement.

The fact that pneumatic tires are found on the smaller capacity vehicles should seem to eliminate the use of the pneumatic tire as a solution. Reduction of speed, elimination of overloads, and restriction of gross tonnage and an increase in depth and width of solid tire equipment will reduce highway damage.

The majority of heavy movement occurs on our trunk highways usually between industrial centers. There is, however, some movement of heavy loads on our secondary highways and generally the result is ultimately the destruction of the highways. Under adverse weather conditions, a single trip of a heavy load over roads built to carry light traffic results in its destruction. An example of what may occur was shown during the "Ship-by-truck" week a little over a year ago when an attempt was made all over the country to relieve the railroad freight congestion. The destruction of highways unable to maintain heavy traffic more than offset by many millions of dollars the economies which resulted by relieving the railroads of their freight congestion.

It is not contemplated that we will ever construct our secondary highways to carry the maximum loads imposed on our primary roads. To prevent the destruction of our secondary systems by heavy trucking vehicles and loads a classification of highways necessary limiting the maximum weight of vehicles moving over each road

AVERAGE TYPES OF COMMODITIES IN WHICH OVERLOADING OCCURS.
Second Connecticut Census, 1921.

Commodity.	Overloads.	Regular Trucking.	Irregular Trucking.
Apples	7	7	..
Bananas	8	8	..
Beer	18	15	3
Butter and eggs	6	5	1
Cocoa beans	6	6	..
Crockery	4	3	1
Drugs	9	7	2
Dry goods	9	7	2
Feed	4	4	..
Fish	10	7	3
Fruit and vegetables	17	15	2
Furniture	20	8	12
Grapes	9	5	4
Groceries	51	46	5
Household goods	22	7	15
Lumber	13	4	9
Litharge	6	6	..
Machinery	5	2	3
Meat products	15	11	4
Merchandise	9	7	2
Paper	4	4	..
Potatoes	4	3	1
Poultry	15	10	4
Rubber goods	9	9	..
Silk	10	10	..
Sugar	18	12	6
Tarvia	4	3	1
Vegetables	16	14	2
Vinegar	5	2	3
Wire	8	8	..
Totals	344	257	87
Percentage of total		75	25

Note.—Products overloaded numbering less than four cases are not included in tabulation.

classification. The Wisconsin Highway Commission recently put into operation a classification of highways with the object of regulating truck weights on its trunk highways and secondary roads. Class A roads limit the loads to 12 tons, while class B roads limit the load to 7½ tons. The majority of Wisconsin highways, primary and secondary at the present time fall under class B. Class A roads consist of the more durable construction types, while Class B consists of the less durable types. Strict supervision of the weights of vehicles using the highway, and severe penalties for violation of such a classification are essential in order to compel obedience to the law regulating the maximum and capacity weights which may move over each class of highways.

In Maryland all loads in excess of 10 tons, vehicle and load, are forced to unload excess weight at once, leaving it on the highway. Ohio orders overloaded trucks off the road. Gross weight limits in the various states range from 6¼ tons maximum in Vermont to 15 tons maximum in California, Michigan and New Jersey. About one-half of the states specify a maximum load per inch of tire width ranging from 500 pounds per inch in Idaho, Oregon and Texas, to 800 pounds per inch in Connecticut, Illinois, Iowa, New Jersey, New York, Pennsylvania, Washington, Wisconsin, Minnesota, Massachusetts, Maine and Kentucky.

Regulations as to gross weight and overloading must take into consideration two road factors. First the differentce in road types, permitting heavier gross loads and loads per inch of tire width on the more durable types, limiting both gross load and weight of wheel load on less durable types. Second in those states in which there are considerable climatic variation, restrictions should be imposed during the early spring, when the pavement is more easily destroyed than later when the frost has disappeared and the road is not susceptible to injury.

The second phase is the problem of overloading per truck capacity. My analysis deals primarily with this problem, which is by far the most serious. The limitation of loads to a maximum of 25,000 pounds does not prevent the overloading of trucks whose rated capacity falls below the maximum load provision.

At each of the census stations the width of tire was taken by measuring the impression made by the wheel load, front and rear, after passing over strips of impression paper. The front and rear axle weight was procured in order to determine the total load and the distribution of load on the front and rear axles. These figures enabled me to determine the wheel-load per inch of tire width for each truck, make, and capacity. The make and capacity of the truck were necessary in order to compare the manufacturer's total weights, and percentage distribution of weights, front and rear axle, with the actual weights recorded to arrive at the overloads per capacity.

Any analysis of overloading has certain limitations in the present state of highway research. (1) The lack of maintenance cost studies of the highways on which the surveys occurred does not permit of establishing accurately the direct relationship which exists between overloading per capacity and high maintenance costs. (2) The effect of overloading on the pavement and subgrade can best be shown when correlated with impact studies of the several pavement types. (3) Criticism of the overload data on the basis of the standard used in determining overloads. The weight standard used to determine overloads for each make and capacity consists of a summation of the manufacturers' 1920 weights for the chassis, body, and rated capacity, giving the total weight when loaded to capacity. The percentage distribution of weight recommended by the manufacturers of trucks for front and rear axle load is used as a standard for determining overloads on the front and rear axle. In order to be conservative 5 per cent. of the total chassis, body and capacity weight was added to the manufacturers' given weight and used as the standard for computing total overloads per capacity. One-half of this 5 per cent. was added to the front and rear axle standard weights in arriving at overloads for the front and rear axle. For example, if the chassis weighs 7,000 pounds, the body 1,600 pounds, capacity 7,000 pounds, a total of 15,600 pounds, 5 per cent. of 15,000 pounds, or 780 pounds, was added, making a standard for total overloads for this capacity of 16,380 pounds. In addition 390 pounds was added to the front and rear axle weight, and the totals used as a standard for judging the front and rear axle overload. This basis seemed fair, and even an allowance of 10 per cent. would have made little material difference in the result.

It has been generally believed that overloading has occurred primarily with trucks loaded with sand, gravel, brick, cement and lumber, and that this abuse was restricted

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Truck Speed Should Be Governed at Wheels

Engineer Discusses the Disadvantages That Arise From Regulating Vehicle Speed by Engine Control

AGITATION favoring the compulsory equipment of motor trucks with a device which would automatically regulate the speed of the engine has begun at the wrong end of the motor car, according to Dr. Miller Reese Hutchinson, former associate of Thomas A. Edison. He says that those motor truck owners who object to the installation of automatic governors on the engines of their trucks are justified in their opposition to any device which would mean the throttling of the engine, therefore, the reduction of its horse-power, for the sake of speed reduction, which should be effected otherwise.

"In this position they are really justified," he says, "because the problem has been attacked from the wrong angle in times past, and these good people still retain the recollection of their inability to climb an ordinary steep grade because the engine speed could not be got high enough, with the governor on the engine, to develop the requisite power.

"An internal-combustion engine, such as is used on all automobiles and trucks, differs materially from a steam engine. The latter develops the same power, at a given steam pressure, at any reasonable speed of rotation of its crank shaft. The internal-combustion engine, on the other hand, does not operate along this line. Such an engine, for instance, as will develop 60 horse-power at 1,200 revolutions per minute of its crank shaft, will give but approximately 15 horse-power when the speed of the engine is reduced to 600 revolutions per minute. Bearing this in mind it is easy to understand why many former efforts automatically to govern the speed of a motor car have not been successful.

"The power required to propel a motor vehicle at 15 miles per hour on a smooth, level, hard roadway, is but a fraction of the power necessary when climbing steep grades.

"One would not want to run an engine continuously at 1,200 revolutions per minute, as when operating on smooth, level roads, simply to be able to have that speed of rotation available in case or when he needs the power which such speed is capable of generating; yet if the speed of the engine is used to operate the governor, it must be set at such value as will enable the truck to handle itself under adverse conditions, or we shall be deliberately robbing the vehicle of a large part of its usefulness through reduced available power.

"To so arrange a truck that its maximum speed would be 15 miles an hour when the engine is rotating at 1,200 revolutions per minute would require a new ratio of gearing between the engine and driving wheels. This would be expensive and impracticable. Therefore, if we want to operate the engine at a sane speed of, say, 600 revolutions per minute when traveling along at 15 miles per hour on 'high' under normal conditions, we must have some scheme whereby that engine speed can be raised, without raising the speed of the vehicle itself.

"The only way in which this can be effected is by letting the road speed of the vehicle—the speed at which it is proceeding—which, after all, is all the law is interested in, do the operating of the engine—to let the vehicle itself throttle the engine when the limit is reached.

"This is very easy of accomplishment. One can use the same governor, simply connecting the shaft to one of the front wheels, as with speed indicators, taximeters, etc., or the shaft between the transmission and rear axle can be utilized, because on its rotation depends the speed at which the rear wheels are driven and hence the speed at which the vehicle is propelled. Furthermore such an arrangement would leave the engine speed perfectly flexible, and its power available up to its maximum, as if and when needed."

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to a relatively small group of commodities.

The types of commodities in which overloads occur per capacity, excluding all commodities in which the number of cases of overloads are less than four, range from apples to wire. Of the cases cited 75 per cent. of the overloading was practiced by regular trucking vehicles.

COMMODITY LOADS IN EXCESS OF 25,000 POUNDS.
Second Connecticut Census, 1921.

Commodity.	Loads.	Overloads per Capacity.	Regular Trucking.	Irregular Trucking.
Brick	2	2	2	..
Butter	1	1	1	..
Cocoa beans	5	1	5	..
Drugs	1	..	1	..
Eggs	1	1	1	..
Fruit	6	5	6	..
Glass	1	1	1	..
Groceries	6	6	6	..
Litharge	3	3	3	..
Meat	2	2	2	..
Plumbing supplies	1	1	1	..
Rubber	5	4	4	1
Sugar	8	8	5	3
Tarvia	2	2	2	..
Valves	1	1	1	..
Vegetables	1	1	1	..
Vinegar	4	4	3	1
Totals	49	43	44	5
Percentage of total		87.8	88.7	11.3

The commodity loads exceeding 25,000 pounds in the second Connecticut census include such articles as the table above indicates. Of the total number in excess of 25,000 pounds gross weight 87.8 per cent. were overloads per capacity, and 88.7 per cent. were overloads by regular trucking vehicles. Thirty-nine out of 41 cases were loaded from 846 pounds per inch of tire width to 1,560 pounds per inch of tire width on the rear axle.

Suggest Yellow Tail-Lights

Automotive engineers are considering the advisability of using yellow in place of red tail-lights so as to minimize the danger of drivers confusing lights placed along highways to indicate dangerous road conditions with motor vehicle tail-lights.

Many accidents occur owing to drivers being confused in this way. A case recently occurred in Chicago in which a driver, not familiar with the road, was following another vehicle late at night. The first machine crossed a river drawbridge, which swung open immediately after it passed. The red-warning light on the light lazy-tong gate that swung across the road as the drawbridge opened closely approximated the position of the tail-light of the first vehicle, so that the driver of the second machine thought that the red light in front was the tail-light of the vehicle he was following. The short section of bridge between the gate and the open draw alone prevented a serious accident.

The red light on the rear of railroad trains is probably the origin of the red tail-light of motor vehicles. A comparison of the reasons for each will, however, show that the use of the red motor tail-light is not logical and, in fact, even dangerous. The railroad train operates on a track and the rear end of that train is dangerous because a train following can not turn out to avoid the preceding train. As motor vehicles do not operate on tracks, however, one following another can generally turn out and pass it. It will thus be appreciated that the rear end of a machine is dangerous only when it is slowing down or standing at the roadside. The use of red lights in automatic or manually operated stop-signals for the rear of vehicles is therefore logical.

The members of the Passenger car and Motor truck Standardization Committees of the Society of Automotive Engineers have studied this proposed change and generally approve it. The fact, however, that the use of red tail-lights is required by law in many states will mean that the change to yellow tail-lights can not be made until the laws in these states are revised. It will, of course, take some time to bring about any complete change from red to yellow tail-lights but, once the wisdom of making such a change if fully appreciated by drivers, legislators will see that the state highway laws are revised to permit the change. The use of existing tail-lamps will in no case be affected as it will be possible to obtain yellow lamp glasses to replace the red lamp glasses now in service, if such a replacement is desired by the individual owners.

The use of yellow as a tail-light will have an exact parallel in railway operation, inasmuch as yellow is used by the railroads as a caution light. This is really what the tail-light of a motor vehicle is intended to be, to caution the following machine that care must be exercised in overtaking and passing other vehicles.

S. A. Miles of the National Automobile Chamber of Commerce has sailed for Europe where he will investigate conditions with particular reference to future sales of American trucks and cars.

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Trucks for the Manufacturer

By PRENTIS HARDY

THE recent past witnessed rail freight embargos, strikes of railway employees and curtailed service, and manufacturers were forced to look around for other means or close down, for the necessity for shipping outbound tonnage and the need of raw materials became very pressing. They, of course, chose the motor truck, and as railroad conditions are still unsatisfactory the motor truck is still a factor in the transportation of manufactured products, and is likely to remain one for all time. Why? Because the manufacturer has found that it not only fits his business, but that it is a necessary means of rapidly transporting his products over short distances. Freight congestion has often held up shipments for weeks and months, thus curtailing production and preventing prompt delivery of the finished product.

More and more we see the motor truck replacing the railroad in interurban hauling. The freight situation has opened up an unbounded field of opportunity and motor trucks are rapidly being put to new and heretofore unthought-of uses. Some manufacturers, in order to avoid the freight congestion, have their raw or other material shipped to points 50 and 60 miles away from which they haul it in by motor truck. Others use trucks exclusively to make deliveries within a radius of 100 miles.

But transportation in almost every manufacturing business involves a number of short hauls with many stops in addition to the heavier routes over long distances. A manufacturer, who, without first studying his problem in every detail, decides to standardize on one type of equipment disregards an element of his business on which much of his financial success depends. It would be unwise to decide to use all motor or all horse equipment providing the proper solution of the problem required a combination of both horses and trucks. Standardization of motor equipment in respect to a particular make, however, is often advantageous and profitable because of the uniformity of operation and interchangeability of motor parts. Whether a transportation system should consist of both horse-drawn vehicles and trucks depends on the nature of the hauling the business involves. Some manufacturers have found horses effective in the carting of refuse or in transporting light material to warehouses and branch factories.

If a manufacturer is operating a large number of motor trucks, he should have a traffic manager whose sole duty it is to direct the truck movements. The traffic manager should be a person of sound judgment and decided executive ability. He should be thoroughly familiar with the principles of motor truck operation, and, although not essentially a repairman, should be able to direct minor troubles which might grow serious if not corrected at once.

One of the greatest advantages which systematic supervision and routing of power equipment affords, besides, protection for the trucks, is the opportunity to keep every unit of the transportation scheme in constant, profitable motion. While motor trucks are running they are earning money for their owners, but if allowed to stand idle or if worked at only half capacity, they represent an expense. The ability of trucks to run without rest gives them a superiority over horse vehicles which can not but mean greater efficiency in transportation and unlimited possibility for further business activity.

The man charged with the supervision of traffic should know at any hour of the day just where each truck is and the best way to send it to the railroad depot, terminal, interurban station and branch factory. He should be familiar with the streets of the territory in which the trucks operate and with their condition. A driver may not realize that he is wasting money by following one route in preference to another. There may be obstructions in a street that would cause long delay or excessive wear on the truck. The traffic man's duty would be to keep the various units operating at the maximum of efficiency by careful routing and close attention to the manner of driving. Even with three or four motor vehicles, owners have attained higher standards of trucking efficiency by delegating the supervision of them to one individual.

The location of the plant will have an important bearing on the manufacturer's transportation problems. Traffic conditions to and from terminals will determine the profitability of the operation. Points to consider are:

1. Is the factory on a navigable waterway?
2. Distance to railway freight house.
3. Nature of railway facilities.
4. Can the trucks proceed in a direct route to railway terminals without encountering congested traffic conditions?

These are factors which have a direct bearing on transportation costs.

The layout of the plant and the facilities for loading and despatching motor trucks are just as important as location. The method of handling raw materials and finished products within the factory yard has a direct bearing on operating costs. The layout of stock floors, location of freight elevators, conveyers, chutes or hoists either facilitate or hinder the quick loading and despatching of motor equipment.

Platforms should be large enough to allow loading of a maximum number of trucks at one time, provided the operation is an extensive one. If the business requires yards or warehouses for the receipt or clearance of shipments, it is important that they be so laid out as to allow easy receipt and despatch. Receiving space should be large enough to enable the handling of a sufficient tonnage so that long waits will be unnecessary.

The use of demountable bodies and trailers may be an advantage in the transportation of raw and manufactured products from factories.

Two or three motor truck chassis can conveniently handle eight to ten demountable bodies, if the haulage distance is not too great, and the loading time is of sufficient length to allow the truck to deliver its load and return. Suitable apparatus should be provided at terminals to allow for the exchange of the empty, or inbound body for the outbound loaded body.

Trailers can be picked up by the outbound truck and left at another factory, for loading, while the truck proceeds on its way. This type of operation is especially desirable in cases where a manufacturer maintains two or more factories, or warehouses in different parts of the city.

Semi-trailer and semi-tractor is still another method by which a manufacturer can ship by motor truck. The tractor simply backs up to the platform, picks up the previously loaded trailer and is off. There is no lost time here, for the motive power is constantly at work throughout the day.

The installation of a power loading device may cut loading time and cost down to a minimum. These devices may be of the conveyer type, winches, gravity chutes, or industrial trucks. There are several good types on the market and the manufacturer in need of such apparatus should give them some thought.

If the owner does not keep cost records he can not know whether his trucks are operating at a profit or loss. This is a question that might well be asked the average user. It is important that the factory user have a record. It will give facts on:—

1. Cost of delivery.
2. Tire mileage.
3. Checking up on the efficiency of the driver.
4. Which truck carries least repair cost.
5. How long it takes to make deliveries.
6. Which truck is proving the most efficient in this regard.
7. The truck which uses the most fuel per mile.
8. The truck which covers the most mileage per day, month and year.
9. What is the largest ton-mileage per truck.
10. Time consumed by a driver on a job.
11. Spare parts ordered and their cost.
12. Daily truck operating cost.
13. Operating cost per mile.
14. Operating cost per month.
15. Garage cost.

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16. How fuel compares with the mileage run.

17. Checks a driver who overloads and overspeeds.

Unless ample facilities are provided for servicing a truck the best results can not be expected from its operation. If the truck is to be kept going, a full supply of parts must always be on hand so that broken parts may be replaced and the truck returned to operation as quickly as possible. A stock of repair parts close at hand is an assurance against loss when something breaks.

Correct lubrication is an insurance against rapid depreciation, repairs and loss. Incorrect lubrication may be due to the use of oils of poor quality or of wrong body. Lack of lubrication is just as undesirable as incorrect lubrication. Insufficient lubrication may be brought about by faulty design as well as inefficient lubricants.

The George E. Keith Company, of Brockton, Massachusetts, operates nine factories, with a total capacity of 24,000 pairs of shoes daily. Of these nine plants one is in South Boston and another in East Weymouth, each 20 to 25 miles from the parent factory at Brockton. A third is at North Adams, 160 miles to the northwest. Each factory performs a special function in the operation of the whole, which makes necessary the constant transfer of goods back and forth between the plants. Up to a little more than a year ago this transfer was made by rail, it is now being done by five 5-ton trucks. During the past 11 months these trucks hauled more than 11,000 tons of materials to and from Boston at about one-half the cost of shipping by rail. It is reported that one of these trucks recently hauled 1,000 cases of shoes.

The factory of the Victor Talking Machine Company at Camden, New Jersey, includes a score of buildings covering 6 acres near the water front. Railway sidings run into the company's yard. The company also owns two lumber yards and a large warehouse nearby.

In view of the variety of the work, the company assigns special duties to special trucks as follows:

1. One truck is assigned to hauling steel and brass from the warehouse.
2. Nine trucks, all 5-tonners, are constantly in use about the yards.
3. One truck is engaged in transporting partitions or palings for the talking-machine crates.
4. One truck is assigned to loading freight-cars with carload lots.
5. One truck is assigned to the record department for whatever duties may be given it.
6. One 2-tonner is used in Philadelphia for local purchases.
7. One 2-tonner is employed continuously by the cabinet department, which has a large separate loading platform.
8. Five trucks haul supplies from the railroad and from local points.
9. Other trucks are used as needed for general transportation purposes.
10. One industrial tractor is engaged in spotting cars on railroad sidings, moving kiln cars in the yard, etc.
11. One industrial tractor is engaged in removing cinders from the fire-room. This has three small dump body trailers which it pulls up an incline into waiting refuse cars. These two tractors are under separate control and are parked in the fire-room.

The advantages of this system are as follows:

When one or more trucks are assigned to a department for its exclusive use, that department can plan its work so as to be sure of having the truck or trucks available at a time when some specially important delivery is to be made or some special shipment called for. Moreover, it entirely avoids the difficulty of important simultaneous calls being made on the trucking department by different departments, which puts it up to the trucking departments to discriminate against one or the other and generally results in argument, ill-feeling and delay.

On the other hand, the company has avoided the danger of keeping one truck idle in one department, when an extra truck is badly needed in another department. Although the separate trucks are under departmental direction, when assigned, the entire fleet is still under the control of the trucking department. Thus, if one department needs more than its usual supply of trucks it can obtain these from the fleet on application. The trucking department knows the needs of the other departments for that day and where work is light trucks are detached and transferred if suitable for the work required. In this way the company attains a happy medium between the two extremes of departmentalization and centralization.

Will Build Exclusive Truck Road

State Highway Commissioner Charles J. Bennett of Connecticut has announced that the 30-mile concrete state highway, which will be built exclusively for motor trucks, will extend from Bridgeport to the state line at Greenwich and will parallel the Boston Post Road. This is said to be the first time in the history of American road-building that such a road has been seriously considered by reason of the expense involved.

Surveys are now being made by the highway department and the project is being closely observed by the federal government. The highway commissioner is personally supervising the making of the surveys. In addition, the highway commissioner is to have the Boston Post Road surveyed from the air, the object being to secure a panoramic view. These views, which will be joined together, are to be taken at the busiest time of the day. It is said that traffic is heavier on the Boston Post Road than on any other road in the country.

Mr. Bennett estimates the cost of the 30-mile truck road at $1,500,000. It was deemed advisable to construct a road exclusively for trucks rather than widen the present highways to accommodate the heavy motor truck travel. Statistics show that an average of 10,000 vehicles a day travel over the road, and of this number trucks are represented to the extent of 2,000, most of them long-distance freight haulers.

Home-Made Dump Body

Motor trucks are becoming so common for farm use that special bodies for hauling the various farm products are being built by a number of different concerns. Many of these answer the purpose admirably, while in other cases they are not exactly suited to the particular demands for some types of farming.

Home-made bodies for motor trucks are not at all uncommon, although in a great many instances these are not entirely satisfactory, but the factor of economy has offset that of convenience. A case where a home-made body has proved exceptionally satisfactory is that of Anderson Brothers, Fullerton, North Dakota, who built a dump body on their International motor truck according to the specifications given below.

By building such a body at home the agricultural truck owner is often able to include certain features which he desires but which he might not be able to obtain in commercial bodies. Very often a farmer has some particular reason for wanting a box of certain width, length or depth and which cannot be obtained in a commercial product. By building his own he can of course have the dimensions exactly as he desires.

The description furnished by one of the Anderson Brothers follows:

"The sides and ends are made of 1x4 inch fir flooring nailed and riveted to the vertical 2x2 inch. The bottom is made of 1⅛x4 inch fir flooring nailed to the oak cross pieces, and bolted to the sills. The outside length of this box is 12 feet and the bottom is 70 inches wide inside. The height is 33 inches to top of rail. The strap bolts are 16x9/16 inch and the braces are ½ inch. The front end is similar to the rear only it has no slide door. The rail on the top edge is of maple flooring, with the tongue and groove removed.

"This box is larger than need be to haul most grain but when it comes to hauling light grain and other goods it is nice to have a large box, and in windy weather it is an advantage to have a large box so one does not need to load the grain so high. The sides and ends can easily be removed and the bottom used as a stake body.

"There is a 2x4 bolted to the truck frame as a subframe and to the top of this the shafting on which the box oscillates is clamped. This shaft is set in 40 inches from the rear end of the box; this makes the load in the rear end of the box act as a counterbalance in dumping the load.

"The winding drums for cable are 2 inch gas pipe fitted to the 2 inch shafting, this shafting is turned down to 1 7/16 inches at each end. The gears used in this hoist are gears for the old style Standard mower; we selected them on account of their deep teeth and low cost, and at the same time this gear set gave us the right gear reduction, 8 to 1. The height of the hoist above frame is 46 inches, but should I build another one I would make it 6 inches higher. The distance between the seat and box is 13 inches. The hoist is not mounted solidly, but is allowed to oscillate on the shafting that it rests on. This keeps it in line with the pull."

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Ohio Limits Withdrawn

Regulations limiting trucks on improved state roads into Canton, Ohio, to a total loaded weight of 6 2/3 tons were rescinded recently by County Surveyor Sickafoose on instructions from Leon C. Herrick, state director of highways and public works, who was responsible for the original order. As a result of the action the limit goes back to 10 tons under the Burke law and a suit filed in Stark County Common Pleas Court to enjoin the operation of the order likely will be dismissed.

The Burke law gave the county surveyor the power to order, subject to approval of the state director, that the weight limit be reduced under special conditions. Acting under this authority a reduction was ordered some time ago and signs posted warning truckmen of the new limit. Suit was filed in Canton on behalf of the truck owners' association of the state in the name of the Dannemiller Grocery Company to enjoin operation of the rule.

In a telephonic communication with Sickafoose, Herrick said that the law will be tested in some county with macadam roads. He will not contest the Stark County suit, he said, because the roads posted there are of brick. He indicated that it was not his intention to post brick roads.

Motor Sweeper Shows Saving Under Difficulties

By EDWARD J. FOSDICK

THE City Council of Westminster in England has been using a motor-driven street-sweeper and after a test of one month has purchased the vehicle. Up to the present the working of this vehicle has been perfectly satisfactory, the only criticism being one of detail concerning the individual method of fixing the bristles of the brushes by staples, instead of as in the ordinary way with pitch, as this stands in the way of refilling by other firms. Still, this is purely a matter of detail which the makers can easily alter if they think advisable; the point lies in the satisfactory figures obtained.

Before considering these figures in detail, however, two points call for attention. The one is that the machine in question is in reality far more than a sweeper, for it is capable not only of sweeping, but of sprinkling, collecting, carrying, and dumping the sweepings. The other point lies in the necessity of emphasizing the conditions prevailing in Westminster, for they differ from those at any place except a few of the London boroughs, and thus offer extremely unfavorable conditions to the advantageous use of such mechanical sweeping appliances. In the main thoroughfares of the area, as, for instance, the Strand and Regent street, day-time traffic on weekdays is far too dense to permit the free use of such a machine, which therefore has to be relegated during weekdays to the quieter areas, such as Pimlico. In the main thoroughfares it is only possible to use the sweeper on Sundays; on other days sweeping in the main streets is effected by the handwork of men stationed about 200 yards apart, as in the case of the Strand, for instance. In the quieter parts, where hand sweeping has also hitherto been in vogue by men (stationed in Belgrave road, for example, about a quarter of a mile apart), and here it has been found possible to dispense with one out of two of these men, for after the machine has run down the street each way, the rest of the day's work over a half-mile length can be handled by a single man.

Were it possible to use the machine in the main thoroughfares on week days, a far larger saving could be effected. Yet, even working under conditions so adverse, a most substantial saving is shown, as the following annual figures prove:

Life of machine costing $10,000, say ten years; annual cost	$1,000.00
Interest on capital at 5½%	550.00
Maintenance per annum, say	750.00
Insurance	100.00
Tax	160.00
Gasolene	1,000.00
Oil and sundries	46.50
Brushes, refilling fifty-two sets at $13.60 per set	715.00
Tires	120.00
Wages of driver, including Sunday overtime	1,203.50
Cost of casual employment during period of overhaul, say four weeks	394.00
Water, say	50.00
	$6,089.00
Saving of wages of sweepers whose services have been dispensed with through the use of this machine	$9,347.00
Brooms	25.00
Orderly trucks	35.00
Cartage	950.00
Sweepers' uniform	192.50
	$10,549.50
Less cost of running as above	6,089.00
Saving per annum	$ 4,460.50

An examination of these figures, especially of the capital charges, indicates the conservative conditions on which they are based. For instance, had the cost of the machine been written off on a sinking-fund basis, the depreciation item would have been markedly lower, while interest on capital, which is 1% above bank rate, is based on the full cost regardless of any depreciation written off. This is presumably because a sinking-fund basis of depreciation can only effectively be employed where a considerable capital is involved, and it has been thought better to treat this machine as an entirely separate entity.

Scrap Paper Collection Costs $1.29 a Ton

By FRED COFFMAN

President, American Paper Stock Company, Indianapolis

WE are using motor trucks to collect practically all the paper which we handle; therefore, to have a truck out of service materially affects our output. Our 2-ton truck has proved its dependability in the year and a half we have owned it.

This company collects waste paper from factories, printing-shops, office buildings, residences, etc., grades the paper and packs it for shipment to various paper mills. The shipments are made by freight, and the trucks are employed only in collecting.

The truck—a Garford—averages only about 18 miles a day, for the paper is all picked up in the down-town district. It makes 6 trips a day, averaging from 4 to 8 stops a trip, and handles an average of 15,000 pounds of paper a day. Under ordinary conditions our trucks handle approximately 18,000 pounds per day, but at present they are not working their full 10 hours.

Our 2-ton Garford truck is costing $9.64 a day to operate, including driver's wages. Repair costs for the year and a half have amounted to only $150.00, as the truck has been making short hauls on well paved streets; but we allow $300.00 a year for maintenance and repairs. Averaging 15,000 pounds of paper a day, it is costing us $1.29 a ton, and 85.62 cents per ton-mile, to handle this paper to our warehouse.

This truck has made several trips to Southport, Indiana, for lumber with which to make crates; otherwise, all its work has been done within the limits of Indianapolis.

While the work performed might be considered a legitimate horse and wagon proposition, for the reason that only a total of 18 miles per day is made, which distance two teams could easily cover, yet, with a 2-ton truck, meeting all requirements at a daily cost of only $9.64, the decision which resulted in buying a motor truck for our haulage problem is remunerating us in savings over horse-drawn vehicles.

OPERATION.

Days operated	455
Miles traveled	8,194
Miles per day	18
Miles per gallon of gasolene	7.1
Miles per gallon of oil	178

AVERAGE COST.

Cost per day (including driver)	$ 9.64
Cost per mile	.5354
Total cost for period	4,387.00

ITEMIZED COST.

Driver cost per day (including above)	$ 4.67
Depreciation per mile	.0847
Maintenance and repair:	
Actual, total	150.00
Actual, per mile	.0183
Estimated, per mile	.0549
Tire cost, actual, per mile	.0408

Fifteen years ago all Detroit's fire apparatus was horse-drawn. On April 10 this year the last horse-drawn vehicles were discarded, the horses sold and now Detroit's fire department is completely motorized.

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New Trailer Regulations Are Proposed in England

By OBSERVER

A FEW years ago, the use of trailers in connection with motor road haulage in England was confined almost entirely to the employment of heavy and unsuitable vehicles for steam wagon traction. Since then, however, the advance which has been made in design and construction and in the widening of the scope of utility of the trailer has been considerable. Moreover—and the realization is essential to the progress of the movement—transport users have begun to recognize that trailing loads, either in part or in whole, can prove in certain classes of work a method which is distinctly economical.

It is imperative that both prime mover and auxiliary non-power carrier be designed and adapted expressly for the purpose for which it is intended to be used, but given the fulfillment of these indispensable qualifications, it is possible to reduce the ton-mile costs of many kinds of haulage by the operation of trailers. It is of interest to study the proposals of the Departmental Committee on the Taxation and Regulation of Road Vehicles in the light of their probable incorporation in the coming new motor transport legislation later in the year.

It is suggested that "trailer" should be defined as any vehicle drawn by a mechanically propelled vehicle other than a sidecar attached to a motorcycle. And before giving some details with reference to regulations peculiar to locomotives, heavy motor-cars or tractors, motor-cars and cycles, agricultural tractors, and to the conveyance of heavy invisible loads, it should be stated what is recommended in the way of general regulations as applied to trailers:

There is no need for a maximum unladen weight.

The unladen weight should be marked on the trailer, and also, if it exceeds 1 ton, the axle weight of each axle.

No axle weight should be above the corresponding figure marked on the trailer, and that the total axle weights should not exceed 14 tons, except in instances of heavy indivisible loads mentioned hereafter.

With a trailer run on non-elastic tires, the latter should not be less than 3 inches in width and that the width of the tire of each wheel should be fixed according to the present regulation on the subject.

The tire (if in the same class) of each wheel which exceeds 1 ton in unladen weight should be smooth and, wherever it comes in contact with the ground, flat. The edges of the tire should be rounded up to a quarter of an inch in sizes of less than 5 inches wide and up to half an inch if of 5 or more inches.

These rules should not be applicable to threshing wagons, plows, or other agricultural implements.

With reference to proposals for special regulations, the first particulars concern trailers drawn by locomotives, and it may be as well to state here the suggested classification of locomotives, namely, that it should include all mechanically propelled vehicles which exceed the maximum unladen weights permitted at present in the case of heavy motor-cars, or which do not conform constructionally with the regulations concerning this class. Furthermore, it is put forward that locomotives exceeding 11½ tons in unladen weight should be termed heavy locomotives, and those not over that weight light locomotives.

The axle weight, either marked or in practice, should not go beyond 7 tons, with a spring trailer, or 6 tons with a vehicle without chassis suspension. The minimum wheel diameter with resilient tires other than pneumatic should be 670 mm. rim fit, and with the non-elastic type as follows:

	With Springs. Ft.	In.	Without Springs. Ft.	In.
Axle weight on any axle not exceeding 4 tons.....	2	9	3	0
Exceeding 4 but not 5 tons..	3	0	3	6
Exceeding 5 but not 6 tons..	3	6	4	0
Exceeding 6 but not 7 tons..	4	0	0	0

As regards the number of trailers permissible to be hauled at one time, no change in the present limit of three laden or unladen and a water-cart or van is advised. It is also suggested that where a light locomotive does not haul more than two trailers, it should be allowed to travel at a speed of 8 miles an hour if wheels of both locomotives and trailers are fitted with soft or elastic tires, but that if any of the vehicles are run on non-elastic tires, the maximum rate should be cut down to 5 miles per hour.

The suggestions affecting trailers drawn by heavy motor-cars or tractors provide that the axle weight, again—marked and in practice—should not exceed 6½ tons. The rim diameter of wheels running on non-elastic tires should be not less than 2 feet 9 inches, and on resilient tires, other than pneumatic, 670 mm. rim fit. A heavy motor-car should only be allowed to trail one laden or unladen vehicle, and a tractor one laden or two unladen. The total gross weight, including the prime mover, however, must not be in excess of 22 tons.

The matter of heavy indivisible loads is becoming of more importance than formerly, for there is an increasing tendency towards the movement by road of heavy articles, the weight of which may exceed the maximum set forth for the gross weight of a laden trailer. The committee, after hearing evidence upon the subject, has arrived at the conclusion that some special provision should be made and some latitude allowed in cases of heavy loads which are indivisible. It therefore recommended that such loads should be allowed to be conveyed without previous notification, by an ordinary trailer provided that its total axle weight does not scale more than 20 tons.

It will be noticed that the figure is less by two tons than that permitted a locomotive. The reasons for this restriction are the better weight distribution as a rule and larger wheels in the case of a locomotive—important factors in the traversing of bridges. It is counseled that trailer chassis carried on two 4-wheeled trucks should be encouraged.

The committee recommends that with a trailer having an undercarrage of two 4-wheeled trucks, a total axle weight of 28 tons as a maximum should be authorized, and without entailing notification of an intended journey by the owner. In order to allow big loads to pass under bridges a further concession is advised—namely, that with trailers of this class 18-inch diameter wheels should be permitted. For the transport of indivisible loads heavier than those already mentioned, it is proposed that it should be incumbent on the owner of the locomotive to send notification with certain particulars in advance to the surveyors of county councils and county borough councils whose districts the load will traverse, and also that the owner should be required to keep a record of the dates and routes for production on request. There is also a recommendation that the fellies, tires, or shoes of the trailer be not less than 8 inches broad, and that any damage resulting from the movements of such loads should be deemed to be damage caused by excessive weight within the meaning of section 23 of the Highways and Locomotives (Amendment) Act, 1878, as amended by the Locomotives Act of 1898.

As regards trailers drawn by motor-cars the special regulations proposed are:

(a) That tires should be pneumatic or of a soft or elastic material, 670 mm. rim fit being advanced as the minimum diameter for wheels with resilient tires other than pneumatic.

(b) That the axle weight of any axle should not exceed 1 ton.

(c) That if the trailer is more than 336 pounds unladen, it should possess an efficient brake which the driver can apply.

(d) That only one trailer be drawn at a time.

(e) That no person should be allowed to travel on the trailer.

With reference to springs, the committee, like the Shortt Committee, encourages the use of springs on the heavier types of trailer by recommending the permission of additional loads on spring-mounted vehicles. It is noteworthy in respect of the distribution of weight between hauling vehicle and trailer that there is a suggestion for the augmentation of the maximum weight to be carried on any axle of a trailer drawn by a heavy motor-car or tractor from 4 tons to 6½ tons.

Hope Grasps at a Straw

"An Akron manufacturer of wagons reports that sales in the last two months have exceeded those of any similar period during the last five or six years and sees a revival in the wagon business and horse market," says the *Wall Street Journal*. "During the past two months wagons have been sold in almost every state and orders are constantly growing. Normal production is expected within the next month.

"Lower costs of maintenance of horses and wagons and less initial investment is responsible for the revival. A team and wagon and all equipment can be purchased for less than $1,000, while a truck will cost much more and the wages of a driver are less than those of the truck driver. Especially in rural sections are sales increasing, although city sales are not lacking.

"The statement surprised the rubber city, where the truck was believed to have definitely proved its advantages over the horse-drawn vehicle."

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State Regulation of Motor Carriers

By HARRY MEIXELL
Secretary, Motor Vehicle Conference Committee

MOTOR vehicles are subjected to two general but distinct uses: First, they are employed by their owners for the transportation of persons or property; second, for the transportation for hire of the persons or property of others than their owners. The second general use is subdivided into two definite and particular uses. In the first place, motor vehicles operating for hire are employed to carry certain persons or the property of certain persons to places prescribed in individual agreements entered into for the purpose; in the second place they are employed to carry indiscriminately all persons or the property of all persons under general conditions of agreement applicable to the whole public. In a word, the second general use of motor vehicles, *i. e.*, for hire, splits into that of private carriers and common carriers.

Until a few years ago the legislatures of our forty-eight states in no way differentiated between these various uses of the motor vehicle in the laws which they enacted dealing with operating requirements, registration fees and the many other subjects which are usually found in a state's motor vehicle laws. In 1914, however, Pennsylvania definitely segregated motor vehicles when used as common carriers and placed them under the regulation of the State's Public Service Commission. To-day the laws of twenty-two states provide for a greater or less degree of such state control.

The following is a tabulation setting forth a digest of the more important matters which through the year 1921 had been made the subject of those state laws specifically enacted to bring motor vehicle common carriers under state control and regulation. This tabulation should be carefully considered in connection with the following discussion of the data which it contains. Without exception state regulation of motor vehicle common carriers has been vested by law in preëxisting state agencies that exercise control over other forms of common carriers such as railroads, "trolleys," telephone and telegraph lines, pipe lines, etc. The third column of the tabulation shows that these agencies have consisted of state public utilities or public service commissions, railroad commissions, the Commerce Commission as in the case of Illinois, the State Tax Commission of Alabama, the Arizona Corporation Commission, or even the State Road Commission as in West Virginia.

In some instances these preëxisting state agencies have assumed control over motor vehicle common carriers by virtue of the broad general powers of the laws establishing the commissions. The Railroad Commission of Georgia, for instance, maintains "that operators of motor vehicles, holding themselves out as carriers of passengers or freight, either or both, for hire, and operating over established routes, are subject to the jurisdiction of this commission. This commission has not, however, had occasion up to this time to exercise this jurisdiction." In certain other instances, however, where the laws have been specifically limited in their application or where their application to motor vehicle common carriers has been a matter of doubt, attempts on the part of the state agencies to extend their power over highway transportation have usually ended in the courts and in decisions adverse to the contemplated expansion of control.

In its broadest conception a motor vehicle common carrier is one that passes any and everywhere over the highways indiscriminately transporting for a consideration all persons who present themselves as passengers or carrying all commodities or classes of commodities offered. Obviously this involves interstate transportation. The federal Interstate Commerce Act takes no specific cognizance of the matter, however, so the application of control by the various states is in no way guided or modified by federal laws on the subject.

A few states deal with the subject merely from the standpoint of local control, the incorporated municipalities being given power by the state legislature to require motor vehicle common carriers to obtain permission and a license for operating from the local governing body. This is the case in Massachusetts, where the board of selectmen or city council exercises control over motor vehicle common carriers transporting passengers.

As for state control this expresses itself in two ways. On the one hand there is a state law whose provisions give to some state agency broad general powers of control over motor vehicle common carriers, On the other hand, for the execution of these powers, the agency is permitted to promulgate and enforce such rules and regulations as it may deem necessary, express stipulation being made in some of the state laws on the subject, that these rules and regulations shall take precedence over municipal ordinances.

The various laws establishing and defining this state control have in many cases, however, greatly narrowed its application. For instance, while most of the states which have dealt with the subject allow their respective state agencies to regulate both passenger and property transportation by motor vehicle common carriers, Alabama, Connecticut, Maine, New Hampshire and others limit this power to passenger transportation only.

Then again, while most of the regulating states apply their powers of control to carriers operating within, into, and out from the limits of incorporated municipalities, California, Ohio and Oregon merely exercise authority over such transportation that is not confined solely to the limits of a city, town or other similar form of incorporated municipality.

As another and final illustration, most state laws regulating motor-vehicle common carriers narrow the scope of such control to vehicles operating "between fixed termini or over a regular route." In the Arizona law this expression is defined to mean the termini between which or the route over which a carrier usually or ordinarily operates his motor vehicle, "even though there may be departures from said termini or route, whether such departures be periodic or irregular." As a rule it is made a question of fact for the state agency exercising control to determine if the carrier is operating "between fixed termini or over a regular route."

With very few exceptions the powers wielded by the public service commissions or similar forms of state agencies over common carrier transportation by motor vehicles are extremely numerous and broad. A consultation of the chart shows that these powers can be listed as follows:

(1) Grant, refuse to grant, amend, or revoke certificates of public convenience and necessity.

(2) Prescribe routes.

(3) Fix schedules.

(4) Determine character of service and promote the comfort and safety of traveling public.

(5) Establish fares and rates.

(6) Require reports and uniform methods of accounting.

(7) Examine accounts and records.

(8) Supervise fiscal affairs, such as incorporation, capitalization of stock, etc.

(9) Compel additions to, extensions of, or betterments in physical equipment.

It is apparent that these powers are practically unlimited and of such a nature that the state agency has almost absolute control over the life or death of motor transportation, within its jurisdiction. Nevertheless all the rulings of the various commissions are subject to review by the proper courts, and aggrieved parties can easily and freely appeal for redress of wrongs or supposed wrongs. Furthermore, in the all-important matter of certificates of public convenience and necessity decisions are usually made contingent on public hearings at which applicants for such certificates, other agencies of transportation serving the same territory and the general public are given full opportunity to present facts and opinons on the subject.

Up to this point in the discussion the entire subject has been approached from the standpoint of the state's power. It is now desirable to look at the question from the side of the operator of a motor vehicle common carrier, especially to learn what steps he must take in order, either to stay in business after a state adopts the policy

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SUMMARY OF SALIENT FEATURES OF STATE LAWS REGULATING MOTOR VEHICLE COMMON CARRIERS

State.	Law in Effect.	State Agency Exercising Control.	Application of Control.	Prerequisites of Operation.	General Powers of State Agency, Etc.	Special or Extra State Taxes.
Alabama	1919	State Tax Commission.	Passenger transportation only. Within, out from, and into municipalities.	Filing of written statement showing terminal points of routes to be covered. Obtaining of special license.	.....	In lieu of regular registration fees, the following: Seating 5 passengers or less, $37.50; over 5 and less than 10, $60.00; over 10, $90.00.
Arizona	1919	Corporation Commission.	Passenger and property transportation. Within, out from, and into municipalities.	Certificate of public convenience and necessity. Indemnity bond as conditioned by commission.	General control over granting of certificate of public convenience and necessity; regulating service; fixing rates and fares.	.....
California	1917	Railroad Commission.	Passenger and property transportation. Out from and into municipalties only.	Certificate of public convenience and necessity.	Grant, refuse, suspend, revoke or amend certificates of public convenience and necessity; prescribe service or extensions thereof; fix rates and fares, supervise fiscal affairs; authorize sale or lease of certificates.	.....
Colorado	1915	Public Utilities Commission.	Passenger and property transportation. Within, out from, and into municipalities.	Permission from municipalities to operate. Certificate of public convenience and necessity.	Wide control over issuance of certificates of public convenience and necessity; prescribe service or extensions thereof; fix rates and fares; promote health, safety and convenience of operation. Municipalities may purchase and operate motor vehicle common carriers.	Special registration fees for passenger-carrying motor vehicles: Seating 9 passengers or less, $20; for each additional seat of capacity, $1.
Connecticut ..	1921	Public Utilities Commission.	Passenger transportation only. Within, out from and into municipalities.	Certificate of public convenience and necessity. Indemnity insurance based on seating capacity; range $5,000 to $10,000 per vehicle.	Grant or withhold certificate of public convenience and necessity. Street-railroad companies may acquire, own and operate motor vehicles for hire.	Extra registration fees as follows: Regular fees plus $15 for vehicle with seating capacity of 5 or less; over 5 but under 21, $2 per seat over 5; 21 but under 41, $5 per seat over 20; 41 or over; 10 per seat over 40.
Florida	....	.....	.....	.....	.....	Special registration fees: For passenger-carrying vehicles: seating capacity 7 or less, $5 per seat; over 7 but less than 17, $7.50 per seat; 17 or over, $10 per seat in addition to 75c per 100 pounds gross weight of vehicle and load. For property carrying vehicles, $1.50 per 100 pounds gross weight on pneumatic tires; $2.25 per 100 pounds on solid tires.
Georgia	1907	Railroad Commission.	.....	.....	The commission holds that it has jurisdiction over motor vehicle common carriers, but has not as yet had occasion to exercise this power.	Special registration fees for passenger-carrying vehicles with a seating capacity of 10 or more, $75.
Illinois	1921	Commerce Commission.	Passenger and property transportation. Within, out from, and into municipalities.	Certificate of public convenience and necessity. Adequate indemnity insurance or sworn statement of ability to meet any possible damage claims.	Grant, refuse, alter, modify certificates of public convenience and necessity. Regulate rates, fares, service, contracts, practices, etc.	Extra state tax on property-carrying vehicles not operated exclusively within a municipality. Gross weight 12,000 pounds or less, 1c per mile; over 12,000 pounds. 2c per mile. On passenger-carrying vehicles gross weight 12,000 pounds or less, 1/15c; over 12,000 but not more than 15,000 pounds, 1/8c; over 15,000 pounds, 1/6c per mile.
Louisiana	....	.....	.....	.....	.....	Special registration fee for passenger carriers: 68c per horsepower plus $2 per passenger up to 8; $3 per passenger, 8-25; $5 per passenger over 25.
Maine	1921	Public Utilities Commission.	Passenger transportation only. Within, out from, and into municipalities.	Certificate of permission.	Make rules and regulations governing operation; fix fares, regulate routes and schedules, etc.	Extra state registration fee amounting to 100% over normal fee.
Maryland	1916	Public Service Commission.	Passenger and property transportation. Within, out from, and into municipalities.	Annual permit.	Grant or refuse permits. Make rules and regulations governing operation. Fix rates, fares, schedules, etc. Provide for safety and convenience of traveling and shipping public.	Special fee $1.20 per horsepower.
Minnesota	....	.....	.....	.....	.....	25% extra registration fee for property-carrying motor vehicles and passenger-carrying motor vehicles seating more than 7 passengers.
Nebraska	1919	State Railway Commission.	Commission has only asserted jurisdiction over property transportation out from and into municipalities.	.....	Commission in 1919 issued an order affecting rates and classifications of property carried by motor vehicle common carriers out from and into municipalities. Order rescinded in 1921.	.....
Nevada	1919	Public Service Commission.	Passenger and property transportation. Within, out from, and into municipalities.	Certificate of public convenience and necessity. Indemnity bond not less than $500 nor more than $10,000 per vehicle.	Issue or withhold certificate of public convenience and necessity. Regulate fares, rates, schedules, classifications. Examine books and records; prescribe service; order improvements, additions, etc.	Extra annual tax of $2 per 100 pounds gross weight for operating on first-class highways. $1 per 100 pounds on second-class; 25c per 100 pounds on other than first- and second-class.

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SUMMARY OF SALIENT FEATURES OF STATE LAWS REGULATING MOTOR VEHICLE COMMON CARRIERS—(Cont.)

State.	Law in Effect.	State Agency Exercising Control.	Application of Control.	Prerequisites of Operation.	General Powers of State Agency, Etc.	Special or Extra State Taxes.
New Hampshire	1919	Public Service Commission.	Passenger transportation only. Within, out from and into municipalities.	Permit to operate. Indemnity bond of $500 per vehicle plus $100 per person of seating capacity.	Grant or refuse permits. Establish reasonable rules and regulations governing operation.	.....
New Jersey...	1921	Board of Public Utilities.	Passenger transportation only and solely where it parallels street-railway lines. Within, out from, and into municipalities. Only applicable to lines established after March 15, 1921.	Indemnity bonds of $5,000 by municipalities in which lines operate.	General supervision, regulations and jurisdiction in the matter of rates, fares, schedules, service, etc.	Special registration fees as follows: 5 passengers or less, $15; 6 to 8, $17.50; 9 to 12, $20; 13 to 17, $25; 18 to 22, $30; 23 to 26, $35; 27 to 30, $40; over 30, $40, plus $2 per seat in excess of 30.
New York.....	1915	Public Service Commission.	Passenger transportation only. Within, out from and into municipalities.	Consent of municipal authorities. Certificate of public convenience and necessity. Indemnity bond as conditioned by the local authorities.	General jurisdiction over rates, fares, schedules, service, etc.	Special registration fees as follows: 5 passengers or less, $15; 6 to 7, $24.50; 8 to 10, $30.50; 11 to 16, $43; 17 to 20, $52; 21 to 22, $55; 23 to 26, $61.50; 27 to 30, $67.50, over $30, $67.50; plus $2 per passenger over 30. Schedule not applicable to omnibus operating wholly within municipality under franchise granted by said municipality.
North Carolina	....	.....	.....	.....	.....	Extra registration fee of 50% over normal fee.
North Dakota.	1919	Board of Railroad Commissioners.	Passenger and property transportation. Within, out from, and into municipalities.	.....	Fix and adjust rates, fares, classifications, schedules, etc. Establish uniform accounts. Investigate books, records, methods, etc,	Extra registration fee for passenger-carrying vehicles, 25c per passenger of seating capacity allowing 16 inches of seating space per passenger.
Ohio	1921	Public Service Commission.	Passenger transportation only. Out from and into municipalities only.	.....	Fix fares; exercise general supervision over the operation of the carrier, regulate general relationship between carrier and public.	.....
Oregon	1921	Public Service Commission.	Passenger and property transportation. Out from and into municipalities only.	Certificate setting forth special terms and conditions under which operation is permitted. Indemnity bonds as conditioned by the commission.	Supervisory and regulatory powers on all matters affecting the relationship of carriers with passengers and shippers. Fix reasonable rates, fares, charges, service, facilities, etc. Supervise and regulate accounts; require reports, data, etc.	For passenger carriers extra registration fee of $4 per passenger allowing 20 inches of seating space per passenger. For property carriers extra registration fee of 50c per inch of total tire width. In addition for both passenger and property carriers an annual fee for administration of motor vehicle common carrier laws of not more than $10 per vehicle.
Pennsylvania .	1914	Public Service Commission.	Passenger and property transportation. Within, out from and into municipalities.	Certificate of public convenience and necessity.	Grant or refuse certificates of public convenience and necessity. Regulate rates, fares, schedules, equipment, service, etc. Examine accounts and records. Require reports, uniform accounting methods, etc.	.....
Rhode Island..	....	.....	.....	.....	.....	Extra registration fee of 100% over normal fee.
Texas	....	.....	.....	.....	.....	Carrying persons or property for hire between municipalities $32 to $160, plus ½c to 4c per mile traveled according to net carrying capacity.
Utah	1918	Public Utilities Commission.	Passenger and property transportation. Within, out from, and into municipalities.	Certificate of public convenience and necessity.	General supervision and regulation. Fix rates, fares, tolls, rentals, charges and classifications; regulate practices, facilities and methods. Establish uniform accounting; make investigations; require reports, etc.	.....
Virginia	....	.....	.....	.....	.....	Extra annual tax of $5 per vehicle in cities and towns of less than 5,000 population; $10 per vehicle where population is 5,000 or over.
Washington ..	1921	Department of Public Works.	Passenger and property transportation. Within, out from, and into municipalities.	Certificate of public convenience and necessity. Indemnity bond $5,000 to $10,000 per vehicle for injury to persons, not over $1,000 for damage to property.	Grant, refuse, suspend, revoke, alter, amend certificate of public convenience and necessity; fix proper rates, fares, charges, classifications, regulations. Prescribe equipment, service and safety of operation. Regulate accounts; require reports, etc.	Extra annual registration fees: Passenger carriers; for vehicles with seating capacity of 8 or less, $10; 50c per passenger over 8. For property carriers, $10 for vehicle of 3 tons or less capacity; $1 per ton of capacity over 3 tons.
West Virginia.	1921	State Road Commission.	Passenger and property transportation. Within, out from, and into municipalities.	Permit to operate.	Grant permits although no discretionary power is vested in commission. Classify vehicles and fix their privilege taxes.	For passenger carriers extra registration fee roughly 100% greater than normal annual fees.
Wisconsin	1915	Railroad Commission.	Passenger transportation only. Within, out from, and into municipalities.	Consent of municipality. Indemnity bonds as fixed and approved by the commission.	Determine adequacy and reasonableness of fares, routes and service. District attorney authorized to enforce rules laid down by commission.	Special fee for passenger carriers operating wholly within a municipality, $10 per vehicle which is in lieu of regular fee.

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of regulation, or to enter the business anew.

In a few states, as New Hampshire, for instance, it is only necessary for the operator to obtain a permit from the state authority. This is the rare exception, however, rather than the rule. In nearly every other state a certificate of public convenience and necessity is required, while in Colorado, New York and Wisconsin a permit from the governing bodies of the municipalities in which the common carrier seeks to operate must also be secured.

IN SEVERAL states motor vehicle common carriers established at the time the law first went into effect have been expressly exempted from this requirement making it necessary for none but operators beginning business after the passage of the law to obtain certificates of public convenience and necessity. In Connecticut, however, and in general in every other state, established, as well as now, motor vehicle common carriers have been obliged to demonstrate to the state agency their right to exist after the state control act has been written into the statute books. Obviously, this has very often meant real hardship to those who have invested substantial sums of money in motor vehicles and have built up paying businesses over certain routes only to be obliged to abandon everything under state regulations.

Another usual prerequisite to the operation of motor vehicle common carriers has been the necessity of taking out indemnity bonds for the payment of any claims that may arise from any injury caused to persons or damage done to property by the carrier. In general the conditions of these indemnity bonds and sometimes their amounts are left to the state agency to determine. Frequently, however, the amounts are fixed by law, as in Washington, where $5,000 to $10,000 is prescribed for indemnification of claims arising from injury to persons and $1,000 for damage to property.

While, in the imposition of annual registration fees and other forms of taxes upon motor vehicles, state legislatures have in only a few cases discriminated between motor vehicle common carriers and private carriers, nevertheless, they have drawn a sharp line between motor vehicles used privately by their owners and those operated for hire. By way of illustration, in Maine a motor vehicle used for hire must pay twice the normal annual registration fee for the class of vehicles to which it belongs. No extra or special charge, however, is made when this vehicle is engaged in the common rather than the private carrier business. It will be noted from the seventh column of the tabulation that, in practically every case where there is state regulation, this course is pursued and special and greater fees in lieu of the regular annual registration fees are imposed, or extra burdens are added to those usually imposed by the state on motor transportation.

In connection with the foregoing discussion it is of interest to note that the laws of Colorado expressly authorize the municipalities of the state to acquire, own and operate motor vehicle common carriers, while in Connecticut the street railway lines are given this same power with respect to passenger-carrying motor vehicles.

Another point worth noting is that, while some states have not gone so far as to place motor vehicle common carriers under the full regulation of a state agency of government, nevertheless, they have enacted laws with a measure of such control in view. To illustrate: In Louisiana a statute approved in 1918 defines a power-driven vehicle carrying passengers or freight for hire over the highways outside incorporated municipalities as a "service car." Operators of service cars are obliged to procure from the police juries of the parishes in which they reside, certificates of their ability and skill to operate and to furnish indemnity bonds against claims arising from injury to persons or damage to property.

A variation from the type of local control exemplified by Massachusetts is that which obtains in Delaware, where the Wilmington Board of Public Utility Commissioners has, with regard to motor vehicle common carriers transporting persons, prerogatives and exercises functions similar to those set forth in this report for the general form of state control.

As has already been observed, the power of the state agency exercising control is usually laid down in the law in general language which is usually so broad and comprehensive that it covers every possible phase of the motor vehicle common carrier business. This control then finds concrete expression in rules and regulations promulgated by the state agency from time to time as occasion warrants. For instance in Nebraska, the State Railway Commission entered an order on May 21, 1919, that, beginning July 1 of the same year, the motor vehicles holding themselves out to carry freight for hire in a certain portion of the state should establish, maintain and apply a prescribed schedule of rates on freight to be classified in accordance with so-called General Order No. 24. In no other portion of the state nor in any other particular did the commission assert its prerogatives. Furthermore, on April 20, 1921, it rescinded and annulled this order.

As an illustration of an entirely different tendency, in Washington State, where the law placing motor vehicle common carriers under control of the Department of Public Works went into effect last year, General Order M. V. No. 1, issued June 9, 1921, provides a very elaborate set of "rules and regulations governing the transportation of persons and property for compensation over any public highway." These cover the procedure for obtaining a certificate of public convenience and necessity for a certain number of prescribed vehicles; what must be done for permission to operate more vehicles in case of emergency; the sale, transfer or mortgaging of certificates; passenger and freight tariffs; rates; free passes; schedules, including changes in or discontinuance thereof; liability and property damage insurance; obligatory equipment including necessity to carry extra tires, speedometers, heating system for passenger carrying vehicles, fire extinguishers, route signs, etc.; operating regulations including in addition to the requirements of the state motor vehicle law, provisions as to the character and conduct of drivers, taking on of passengers and seating thereof, baggage, comfort stations, etc.; fees additional to the state registration fees; annual reports, etc.

Any discussion of state regulation of the motor vehicle when used as a common carrier would be incomplete without reference to the arguments for and against such regulation. In so doing, however, the opinion frequently expressed that railroad and trolley companies, as a result of the severe competition of motor transportation, are seeking state regulation as a means of killing off such competition, will be totally disregarded, and only such arguments recorded as are predicated on public welfare, sound economics and strict impartiality.

With these premises, therefore, those who contend for state regulation say that such control is necessary:

(1) Because motor transportation for hire is public utility and as such should be regulated along with other public vehicles so that travelers and shippers by such means can be made sure of safe, prompt, regular, adequate, efficient and economical service.

(2) So that, in all cases where motor vehicle common carriers come, or are likely to come, in ruinous competition with other common carriers, the state can step in and determine whether public convenience and necessity require such competition, and save, if desirable, the preëxisting agencies of transportation.

(3) In order to shoulder upon the motor vehicle common carrier obligations, financial and otherwise, in return for the right given it to operate for a profit over all or certain highways within a state especially so since the highways are built and maintained by the public. In some cases these rights take the form of valuable franchises which virtually grant monopolistic privileges over certain routes.

(4) For the purpose of eliminating the irresponsible, so-called "fly-by-night" companies and individuals who, while undergoing certain destruction for themselves, pull down with the ruin well managed motor transportation agencies which render a real public service and are entitled to a reasonable return on their investments and a stabilization of their business.

IN OBJECTION to these arguments for state regulation of the motor vehicle common carrier, opponents of the proposition maintain:

(1) That granted motor transportation for hire is a public utility, public interest can best be served by unrestricted competition and complete freedom from regulation in which none but the fittest can survive. This policy they contend will yield to passengers and shippers the maximum results with the minimum cost.

They deny any analogy between motor vehicle common carriers and railroad and trolley transportation agencies, pointing out that the latter by virtue of private ownership of franchises, rights of way, road beds, tracks and terminals have an exclusive and monopolistic control over all transportation on their routes. Motor truck operators, on the other hand, even where granted a monopoly of transportation for hire over a certain prescribed highway or portion thereof can not deny the use of that highway to others who wish for themselves or as private carriers to transport persons or property over those same routes.

Finally, they point out that governmental

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regulation of rail and trolley common carriers came after these agencies had abused their rights and privileges and through pools, stifling of competition, exorbitant increase of rates, discrimination, stock-watering, etc., made it necessary for the public in self-protection to subject them to control. By the very nature of the service these evils are impossible with motor transportation since the road is free to the use of everyone and motor vehicles—the medium for transportation over the roads—are quickly, cheaply and in unlimited numbers available for everyone.

(2) Since the obvious outcome of the first argument advanced against state regulation is "cut-throat" competition between various forms of transportation attempting to serve a certain territory and *per se* between the motor transportation companies themselves operating in competition over certain highway routes, the opponents of state regulation can not escape the query whether they are willing to face the logical consequences of such a struggle. Without hesitation they answer that wherever rail, trolley, or any other form of transportation for hire cannot stand up before a newer and better form, public interest demands that it should give way; likewise within that newer and better form of transportation, the rule should be survival of none but the most efficient and economical agencies. They are confident that even though such a policy may mean the destruction at times of more or less invested capital, as it did when rail and inland water transportation first came into acute competition, the final economic benefits to the community as a whole will many times compensate for the loss involved.

(3) As for shouldering upon motor transportation for hire financial and other burdens which it should rightly carry, opponents of state regulation say that legislative bodies have not heretofore found it necessary to establish such control in order to determine the weight limits for motor vehicles used as common carriers; their registration fees and other charges; their liability to the public for injury to persons or damage to property, etc. If this is all that is involved it is not sufficient to warrant almost unlimited regulation in all other respects by a state agency.

(4) Lastly, those against state regulation believe that the natural working out of economic laws will do more to stabilize the motor transportation for hire business than extensive interference on the part of governmental agencies of any sort. They feel that the proposition is paternalistic and will result either in discrimination in favor of one or more types of transportation, and against all the rest, or that it will promote monopolistic advantages for certain motor transportation companies and that, through it, all the traveling and shipping public will pay the cost.

In even-numbered years the activities of state legislatures are relatively light since no more than eleven or twelve state lawmaking bodies get together in regular session while few of the others meet in special session. Notwithstanding this fact 1922 is producing a big crop of bills dealing with motor vehicle common carriers. The Arizona State Legislature now in special session and the current regular sessions of the Maryland, New Jersey and New York State Legislatures are considering extensions of the existing powers of their state agencies exercising control over motor vehicle common carriers. On the other hand in Kentucky, Massachusetts, Mississippi, Rhode Island, South Carolina, and Virginia where the state legislatures are in regular session, and where as yet there is no such regulation, many measures aiming to bring about a greater or less amount of such control are now receiving the careful consideration of the legislators.

In this connection it is interesting to note that in New Jersey the strongest and most active opponents of state regulation and the extensions thereof have introduced and are striving to bring about exclusive power in the premises for the local incorporated municipalities. Apart from any other arguments pro and con for such local control, it must be apparent that the operation of a motor vehicle common carrier beyond the confines of a single municipal jurisdiction of a state becomes extremely complicated and burdensome under such cirsumstances and is likely to suffer from the varying policies of constantly shifting local governing bodies.

Another interesting movement to note in some states is proposed legislation to require every common carrier motor vehicle engaged in the transportation of passengers to have both a front and rear entrance, while in Maryland a pending measure would require not only a chauffeur but also a conductor on every such vehicle. This would seem to indicate that some state lawmakers seek to rewrite in motor 'bus transportation the full crew laws which for a long time have been an economic burden on the railroads.

In the tabulation given the omission of a state means that there are no state laws regulating motor vehicle common carriers. The states which have not yet adopted such laws include Arkansas, Delaware Florida, Idaho, Indiana, Iowa, Kansas, Kentucky, Massachusetts, Michigan, Mississippi, Missouri, Montana, New Mexico, Oklahoma, South Carolina, South Dakota, Tennessee, Vermont and Wyoming. Other states which have no such laws but levy special fees on motor carriers are Florida, Louisiana, Minnesota, North Carolina, Rhode Island, Texas and Virginia.

Wages in Motor Industry

Magnus W. Alexander, managing director of the National Industrial Conference Board in an address at Detroit gave some interesting statistics concerning the wage situation in the automotive industry. Among other things he said:

"Whereas the average hourly earnings of wage earners in the automobile industry were 29.3 cents in July, 1914, rose to 70.5 cents in September, 1920, and then fell to 58.6 cents in June, 1921, corresponding earnings for wage earners in all American manufacturing industry were 24.4 cents in July, 1914, 62.4 cents in September, 1920, and 52.1 cents in June, 1921. There were 18 other principal industries which, during the last 7-year period, showed a greater percentage net increase of hourly earnings than was shown in the automobile industry.

"In respect to weekly earnings, a slightly different picture is presented because of the influence of part time employment during the 1920-1921 period. Average weekly wages in the automobile manufacturing industry rose from $15.71 in July, 1914, to $34.34 in July, 1920, equal to 119 per cent. increase, and then dropped to $25.40 in June, 1921, resulting in a net increase of 62 per cent. over the 1914 base line. Average hourly wages in all American manufacturing industry rose from $12.40 in July, 1914, to $29.81, or by 140 per cent., in July, 1920, and then dropped to $22.89 in June, 1921, resulting in a net increase of 85 per cent. over the 1914 base line."

"The total employment in the automobile industry decreased 52.3 per cent. from June, 1920, to July, 1921, and in all industry the decrease was only 37.1 per cent. In the automobile industry the volume of employment reached its low point at the beginning of 1921, followed by a marked revival up to May, 1921, and then by a considerable slump in June of that year. A comparison of employment in the automobile industry with all American industry reflects the enormous growth of the former as compared with the average for the latter.

"There is a relationship between the money wages earned and the prevailing cost of living which must be taken into account to secure an adequate measure of the wage purchasing power of the wage-earner or of his economic status at one time as compared with another time. After all, it is not so important to know how much anyone earns as to know how much he can buy in terms of necessities and comforts of life with the money that he is earning. To ascertain the purchasing power of the money wage, or the real wage, it is therefore necessary to divide the money earnings by the cost of living; and the result will measure the economic status of the worker.

"On this basis the automobile manufacturing industry shows that the hourly real earnings of the workers in June, 1921, were 24 per cent. higher than those in July, 1914, while the real weekly earnings were at practically the same level. For American manufacturing industry as a whole, the economic status of the average wage-earner had increased during the same period by 32 per cent. for hourly earnings and by 14.3 per cent. for weekly earnings. The results of this comparison check with the previously stated fact that to begin with the actual money earnings of the automobile workers in 1914 had been greater and had also increased to a lesser percentage during the following 7-year period than was the case with the general industrial workers.

A survey made by the New York State Bureau of Municipal Information shows that in 1921 over 6,000 motor vehicles were owned and operated by 60 out of the 100 largest cities in the United States. Fire apparatus and privately owned cars of which the city pays operating expenses are excluded from the above total.

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Foreign Truck Markets Are Still Unattractive

By GORDON LEE

Chief, Automotive Division, Bureau of Foreign and Domestic Commerce

PROSPECTS are generally good for the sale of motor trucks in Brazil, especially in the 1½-ton size, according to recent reports. Contingent factors, however, are the betterment of exchange and the improvement of roads. While business is improving slowly the demand for motor trucks in Sao Paulo, of which there are about 800 in the district, will continue to increase as there is a decided campaign on for the improvement and building of roads. The city of Sao Paulo is more or less the industrial center of Brazil and motor trucks are much used there. While at present and for some time to come Bahia offers a poor market for trucks, there should be a fair demand for heavy-duty machines when the exchange becomes normal, although the high price of gasolene and cheapness of labor are serious drawbacks. Great quantities of heavy goods, such as hides, skins, cocoa, sugar and tobacco are constantly being moved from the warehouses to the docks. At present this merchandise is transported by small 2-wheel carts capable of carrying about one-half ton each and, on account of the large number required to handle the business, the traffic is often blocked. There are not more than one dozen trucks now being used in Bahia.

The market for motor trucks in the Rio de Janeiro district is limited to the city of Rio de Janeiro, the main hindrance to the greater use being the lack of roads outside the city. The interior traffic is practically limited to oxcarts, the roads being unfit for automotive vehicles. Trucks sold in the city of Rio de Janeiro are mostly of 1½-ton capacity. The 7-ton type may be classed second, with the 2, 5 and 3-ton models next in the order named. The number of trucks in the district is estimated at about 500.

At present depressed financial conditions prevail in the Porto Alegre district and the importation of motor vehicles has been reduced materially. Even in normal times, owing to the lack of good roads, the demand for trucks is limited, and their use is almost exclusively confined to the larger cities. The majority of trucks are of the 1½-ton size, equipped with bodies constructed locally.

The demand in Argentina is improving. March imports from the United States of passenger-cars, not including Fords, totaled 301, chassis 3, and motor trucks 3, as against 42 passenger-cars, 28 chassis and 8 motor trucks from Europe. Two hundred and sixteen cases of accessories reached the country.

The market for motor trucks in the United Kingdom is decidedly unfavorable, the most important factor contributing to this condition in England being the oversupply on account of the surplus army stocks at Slough in Berkshire and the policy of the government in realizing on these supplies on the deferred payment basis. Agents of truck manufacturers state that at the present time they are utterly unable to move their stocks because of the far more advantageous price and credit terms being offered by the government, which is selling reconditioned trucks with a six months' guarantee, as low as $250, whereas local dealers have had stocks on hand for over a year which they offer at $3,500 to $4,000.

The market in Scotland is depressed as a result of the general stagnation in trade and industry, and until the hoped for revival is apparent the prospects for the sale of motor trucks are not encouraging. In this section of the country the demand will be chiefly for the heavier types, while the light delivery wagons are enjoying increasing popularity.

The sale of American motor trucks in France is greatly hampered at present not only by the French import duty of 45 per cent. *ad valorem*, but also by other adverse circumstances. The difficulties in the Lyon district are due largely to the depreciation of French exchange, the activity of French truck manufacturers who are able to promise immediate delivery (the Berliet factory has its plant at Lyon), the existence of large army stocks and the alleged inadequacy of repair facilities for American vehicles resulting from the lack of spare parts and experienced workmen. It is believed, however, that connections made now will be of value in the near future.

Owing to the exceedingly high price of gasolene motor trucks are being used to a very small degree in the Limoges district, and industrial firms are unwilling to substitute the trucks for horses until the cost of fuel is reduced. Consequently large quantities of raw materials and finished goods are now being carted to and from the railway stations to all quarters of the cities by horses. Some large trucks were purchased from the American army stocks, while the number of lighter models is negligible. There will be little opportunity for the sale of trucks for several years to come.

The very small demand in the Nancy district is due in a large measure to the liquidation of army stocks, and as long as the general depression lasts no improvement in the motor truck market can be expected. The 1½- and 5-ton trucks with low gasolene consumption are preferred.

During 1921 the market for motor vehicles in Straits Settlements was exceedingly dull due to the slump in rubber and tin, and there was practically no importation of motor trucks. The current year will undoubtedly witness somewhat better conditions. A great deal of the hauling in the Straits Settlements is done by oxcarts and hand carts, which is a very tedious and slow method, but comparatively cheap. While there are excellent roads throughout the colony and the Federated Malay States, those on the private estates are not fit for the use of motor trucks. Many hired cars traverse the roads carrying passengers and produce of all kinds. As most of these cars are in a disreputable condition it would appear that they might be superseded by motor trucks; none of the latter, however, have been introduced during the past year. At present, there are only about 50 motor trucks in Penang.

At present the truck business is exceedingly dull due to the unsettled conditions throughout the Near East. An attractive field for the sale of all kinds of automotive products will undoubtedly be offered in Asia Minor when peace is re-established and the several trade routes leading out of Constantinople are reopened.

British and French West Africa have begun to import trucks to a considerable extent, and while money at present is scarce importers are quite prepared to do business. Trucks are used in collecting the raw products and transporting them to the railway, river and shipping stations and for the distribution of imported goods. The seaports have begun to use trucks almost exclusively for hauling instead of the old method of head carriage. The ½- and 1½-ton trucks are those preferred. In most of the colonies heavy trucks are prohibited by law.

Tire Business Better

Statistics of the rubber industry for the first two months of the year as compared with the same period in 1921 show a very material increase in production of casings, tubes and solid tires.

Notwithstanding this fact, inventories for both months were considerably less except in the case of tubes, which show stocks on hand at the end of February larger than at the close of either January or February, 1921. Shipments were materially larger, but the gain was not so great in comparison with last year as in the production field. Tire production for the first two months of the year was running at the rate of more than 24,000,000 per annum.

Details for the two months of 1921 and 1922 follow:

SOLID TIRES.

	Inventory.	Production.	Shipments.
1921—			
Jan.	303,753	21,220	29,116
Feb.	304,374	23,365	29,599
1922—			
Jan.	182,000	40,000	33,000
Feb.	183,000	39,000	37,000

CASINGS.

	Inventory.	Production.	Shipments.
1921—			
Jan.	5,319,605	703,430	965,417
Feb.	5,193,018	819,892	1,073,756
1922—			
Jan.	4,174,000	2,055,000	1,597,000
Feb.	4,691,000	2,084,000	1,562,000

TUBES.

	Inventory.	Production.	Shipments.
1921—			
Jan.	5,586,163	740,824	1,042,617
Feb.	5,415,464	916,627	1,129,881
1922—			
Jan.	5,247,000	2,343,000	1,890,000
Feb.	6,142,000	2,597,000	1,703,000

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

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Trucks Shattering Test Road

Some of the lighter sections of the Bate experimental road failed under the traffic of light trucks driven along the edges of the surfaces on the first day of the test. The road, which was especially constructed for the experiments now being conducted by the State Highway Department of Illinois in coöperation with the Bureau of Public Roads, United States Department of Agriculture, is 2 miles long and consists of numerous sections of different types of construction.

On March 30, the day the road was opened for the tests, 12 trucks with bodies removed to make a load of 2,500 pounds on each rear wheel were started on the trips, which will continue with increasing loads until the suitability of each type is determined. The trucks were driven so that the outside wheels were on the edge of the paving, and almost immediately some of the sections began to fall. This was expected, as the sections were of light design and intended to demonstrate the futility of such construction.

The road will be subjected to a number of tests under the destructive pounding of the trucks, and it is expected that much valuable information will be gained for use in future road construction. In addition to specialists assigned to investigate soil conditions, temperature effects, and other factors, five engineers are constantly observing the effect as the trucks continue their daily grind. The experiments will continue until all the sections have been thoroughly tested.

Rail Motors in Mexico

Almost coincident with the successful experiment in Port au Prince, Haiti, comes a report from Mexico City of a system of street-cars built on motor truck chassis. According to William Benbow, the motor railway was worked out only after a long series of experiments by the Monte Alto Railroad Company.

"It ran its cars up the steepest hills and around the worst curves at a speed of 26 miles per hour," says Mr. Benbow, "and that is just about as rapid movement as any man in his senses wants on that particular railroad."

The "street-car" chassis weighs approximately 6,600 pounds, with a wheel-base of 7 feet. The transmission is adjusted with the original rear axle of the chassis, and sprockets for the chains are placed in the naves of the wheels. The diameter of the wheels is 22 inches. With this car the railway company claims to be able to carry 40 passengers, and with the addition of a trailer 80 can be transported. The 18-mile trip from Mexico City into the interior takes about an hour.

The operation of the motor-railroad has been so successful that the Monte Alto officials are planning to add eight or ten more cars of similar construction. Railroad officials in Desague, San Rafael and Atlixco are also studying the possibilities for similar cars in their territories.

Folding Top Char-a-bancs

An English body-builder has developed a new type of vehicle which has been christened a "charabus," since it is both a 'bus and a charabancs. The latter is the English and French term for open 'buses, which are called stages, coaches or sightseeing 'buses in the United States. The vehicle is soundly designed and constructed and may readily be transformed from an open to a closed type or *vice versa*.

The main portion of the roof is designed to fold up so that it occupies only a narrow portion along the center while the side windows may be dropped out of sight. The fact that the roof occupies so little space when the 'bus is open makes it ideal for sightseeing and for touring. The front and rear of the "charabus" are built permanently in order to protect the occupants from wind and dust and also to simplify the construction. The vehicle has a normal seating capacity of 28 with 6 auxiliary seats which are placed in the aisle and may be swung out of the way readily.

35,092 Trucks in California

California's 35,092 motor trucks registered on January 31 of this year were distributed among the various counties of the state in the following manner:

County.	Trucks.	County.	Trucks.
Alameda	2,221	Placer	256
Alpine	5	Plumas	55
Amador	55	Riverside	337
Butte	329	Sacramento	1,178
Calaveras	63	San Benito	170
Colusa	130	San Bernardino	502
Contra Costa	415	San Diego	5,135
Del Norte	33	San Francisco	901
El Dorado	93	San Joaquin	892
Fresno	1,663	San Luis Obispo	189
Glenn	139	San Mateo	364
Humboldt	360	Santa Barbara	279
Imperial	353	Santa Clara	1,110
Inyo	37	Santa Cruz	352
Kern	773	Shasta	184
Kings	179	Sierra	13
Lake	66	Siskiyou	149
Lassen	39	Solano	278
Los Angeles	1,142	Sonoma	734
Madera	132	Stanislaus	457
Marin	170	Sutter	165
Mariposa	39	Tehama	113
Mendocino	246	Trinity	7
Merced	299	Tulare	692
Modoc	28	Tuolumne	59
Mono	8	Ventura	231
Monterey	249	Yolo	233
Napa	197	Yuba	154
Nevada	33		
Orange	513	Totals	35,092

Packard Gross Profits $1,015,603

For the six months ended February 28, 1922, Packard Motor Car Company shows gross profits of $1,015,603. Selling and general expenses totaled $780,981, leaving $234,622 profit before deducting interest and operating losses. Interest charges of $383,221, bond discount of $55,749 plus $570,197 loss from branch operations resulted in a net loss of $774,546 for the period.

Factory sales	$13,687,737
Cost of sales, including depreciation	12,999,613
Profit from sales	$ 688,124
Other income	327,479
Gross profit	$ 1,015,603
Selling, general and administration expenses	780,981
Balance	$ 234,622
Interest	$ 438,971
Los from factory operations	$ 204,349
Loss from branch operations	570,197
Net loss, six months	$ 774,546

Regulate Trucks, Says Hilton

Taking decided issue with the arguments of Henry Ford that the only solution of the carriers' problem to-day is in a reduction of freight and passenger rates as a means of increasing railroad earnings, Alexander C. Hilton, traffic vice-president of the 'Frisco, told members of the Traffic Club that Ford was "visionary and impractical."

Mr. Hilton also advised members to begin a close study of the automotive industry, which, he said, is playing havoc with the receipts of the carrier roads. He suggested the appointment of a national committee of traffic club members to formulate plans to insist on the enactment of more drastic regulations of motor carriers and to see that such organizations engaged in competition with carriers be forced to pay their share of the tax burden, now largely shouldered by the railroads.

EXPORTS OF MOTOR TRUCKS, FEBRUARY, 1922.

COUNTRIES.	MOTOR TRUCKS AND 'BUSES. 1-ton and less. (No.)	(Value)	1¼- to 2½-tons. (No.)	(Value)	Over 2½-ton. (No.)	(Value)	ELECTRIC TRUCKS AND CARS. (No.)	(Value)
Belgium	120	$34,114	1	$1,257	.....	.....	1	$900
France	2	748	.....	.....	.....	.....	.....	.....
Germany	.....	.....	10	33,875	.....	.....	.....	.....
Hungary	1	389	.....	.....	.....	.....	.....	.....
Netherlands	24	9,294	.....	.....	.....	.....	.....	.....
Sweden	.....	.....	.....	.....	.....	.....	1	1,678
England	.....	.....	6	5,865	.....	.....	.....	.....
Canada—								
Quebec and Ontario	3	3,478	48	52,043	5	$9,638	.....	.....
British Columbia&Yukon	.....	.....	5	8,986	.....	.....	.....	.....
Nicaragua	1	1,400	.....	.....	.....	.....	.....	.....
Panama	4	1,698	.....	.....	.....	.....	.....	.....
Mexico	59	23,510	23	27,622	6	12,293	.....	.....
Barbados	.....	.....	1	680	.....	.....	.....	.....
Jamaica	4	1,698	2	5,300	.....	.....	.....	.....
Other British West Indies	2	849	.....	.....	2	6,900	.....	.....
Cuba	.....	.....	3	2,948	.....	.....	.....	.....
Dutch West Indies	1	424	.....	.....	.....	.....	.....	.....
Haiti	1	424	.....	.....	.....	.....	.....	.....
Colombia	3	1,274	1	934	.....	.....	.....	.....
Peru	.....	.....	1	1,211	.....	.....	.....	.....
British India	2	2,052	.....	.....	.....	.....	.....	.....
Ceylon	.....	.....	.....	.....	2	8,956	.....	.....
China	.....	.....	.....	.....	.....	.....	5	2,675
Java and Madura	.....	.....	1	3,925	1	3,220	.....	.....
Japan	50	25,980	9	22,379	1	5,000	3	8,589
Palestine Syria	2	1,000	.....	.....	.....	.....	.....	.....
Australia	7	8,855	17	25,450	6	10,240	.....	.....
New Zealand	.....	.....	5	8,612	.....	.....	.....	.....
British West Africa	.....	.....	2	2,173	.....	.....	.....	.....
British South Africa	.....	.....	6	6,944	4	8,100	.....	.....
Totals	286	$117,187	141	$210,204	27	$64,347	10	$13,842

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$550,000 Offered for Bethlehem

Howard B. Hall, of New York, was the high bidder for the property of the Bethlehem Motors Corporation at the receiver's sale held at Allentown, Pennsylvania, April 18. His bid for the property in its entirety was $550,000. The next highest bidder was the Creditors' Syndicate Committee who offered $540,000. The sale, of course, is subject to confirmation by the United States Courts. Mr. Hall, a former vice-president of the corporation, represents interests which have not as yet entered the records. It is known that some of his former associates in the old company for some time have regarded the property with speculative interest and have considered plans for restoring it to productive form. Just how far these plans have progressed those in position to know are at present disinclined to state.

Kelly-Springfield Elects Directors

Three new directors were named at a recent meeting of the board of the Kelly-Springfield Motor Truck Company at Springfield, Ohio. The new directors include Alfred G. Hare, of Hare & Chase, Philadelphia, succeeding Emlen S. Hare; James M. McCarthy, of Quebec; and Burton G. Westcott, president of the Westcott Motor Car Company. Mr. McCarthy was also elected vice-president. The business of the company, it was made known, had substantially improved and plans have been concluded for an increase of 25 per cent. in operations by the first of May.

General Motors Statement

A preliminary statement of the General Motors Corporation, for the year ended December 31, 1921, shows that, after providing for depreciation, inventory adjustments, etc., and setting up a reserve of $14,000,000 to cover anticipated losses not yet ascertainable, there was a deficit of $38,680,770. This compares with net income of $37,750,375 in 1920, which, after deduction of preferred and debenture dividends, was equivalent to $1.58 a share earned on the common stock. The deficit, after dividends for 1921, was $65,459,056, against a surplus of $14,236,660 in the preceding year. The profit and loss surplus at the close of last year totaled $55,814,160, compared with $121,273,217 on December 31, 1920.

The effect of losses and adjustments which occurred in units undergoing liquidation and reorganization is shown by considering operations in two classes. Class "A" comprises divisions which are thoroughly established and whose product does not require radical readjustments. Class "B" comprises divisions which were undergoing reorganization, including some cases of complete abandonment and liquidation.

The preliminary consolidated income account for the year 1921 and the consolidated balance sheet as at December 31, 1921, compare as follows:

In his remarks to stockholders, Pierre S. du Pont, chairman, says in part:

"The automobile industry, in common with many other important industries, has passed through a year of unprecedented difficulties and hardships, 1921 having marked a period of drastic deflation from the extraordinary expansion which began in 1919 and extended through the first half of 1920. During the period of this expansion the company extended its manufacturing facilities and provided for production on an enlarged scale to meet the demands which it was expected would continue.

"Plans and policies which have guided the management have meant the entire abandonment of certain former products, and the change in design and improvement of quality of other lines, which have involved heavy losses in the liquidation of stock and obsolete material. Extraordinary adjustments have also been made in inventories and material commitments, so that books at the close of 1921 show these items at current market values and normal in volume with respect to nearby production requirements.

"In considering the results of the year's operations attention is directed to the satisfactory showing of the units comprised in Class A and to the further fact that the adjustments in inventories and in rearrangement and improvement in the quality of its product have placed company in position to conduct its operations in 1922 with every promise of profitable results."

	1921.	1920.	1919.	1918.
Net, Class A*	$29,671,494	$.....	$.....	$.....
Losses, Class B§	$16,431,548	.....	.....	.....
Net after tax, depreciation, etc	$13,239,946	$82,762,063	$103,667,699	$.....
Interest and empl. inv. fund, etc	7,455,164	11,594,750	11,138,069	.....
Balance	$ 5,784,782	$71,167,313	$92,529,630	$.....
Inv., adj., etc	19,044,449	18,502,189	.....	.....
Empl. house development	.....	3,387,603	2,012,111	.....
Net loss	$13,259,667	†$49,277,521	†$90,517,519	†$35,504,576
Federal taxes and extra expense	.....	3,894,000	30,000,000	20,113,548
Rebates and losses, etc	¶11,421,103	.....	.....	.....
Special reserve	‖14,000,000	7,500,000	.....	.....
Deficit	$38,680,770	‡$37,883,521	‡$60,517,519	‡$15,391,028
General Motors proportion	.....	37,750,375	60,005,484	14,825,530
Debenture dividends	5,339,005	4,646,678	3,180,136	739,566
Preferred dividends	971,004	973,748	1,032,376	1,180,901
Deficit	$44,990,779	‡$32,129,949	‡$55,792,972	‡$12,905,063
Common cash dividends	20,468,277	17,893,289	17,324,541	11,237,310
Deficit	$65,459,056	‡$14,236,660	‡$38,468,431	‡$1,667,753
Profit and loss surplus	55,814,160	121,273,217	78,641,897	36,408,937

*Represents divisions which are thoroughly established, and whose product is standardized and does not require radical readjustment. †Profit. ‡Surplus. §Represents divisions which were undergoing reorganization and rearrangement of product, including some cases of complete abandonment and liquidation. ¶Cost of cancellation of commitments, rebates and other losses charged off in 1921 in excess of reserve created at close of 1920. ‖To cover anticipated losses and unforeseen contingencies pertaining to 1921 or prior years, but not at present definitely ascertainable.

Assets.	1921.	1920.	1919.	1918.
Real estate, plant, equipment	$248,593,752	$248,788,766	$176,888,467	$ 76,756,431
General Motors stock in treasury	3,889,800	.....	.....	.....
Miscellaneous inventory	56,377,032	67,985,100	53,398,491	2,839,531
Cash	40,057,402	47,332,842	48,231,200	30,636,622
Government securities	5,228	41,262	213,218	28,852,018
Notes and accounts receivable, etc	28,417,064	45,350,845	37,694,267	32,617,370
Market securities	27,009	34,096	989,448	172,305
Inventories	108,762,625	164,684,679	128,696,652	91,137,513
Preferred expenses	1,944,988	1,891,854	582,356	.....
Deferred expenses	4,609,678	6,282,606	2,719,357	762,652
Good will, patents, etc	22,438,401	22,414,818	20,323,889	35,714,893
Total	$515,122,979	$604,806,868	$469,737,345	$299,489,335
Liabilities.				
Debenture stock, 7%	26,931,600	25,153,500	.....	.....
Debenture stock, 6%	60,801,000	56,366,900	68,339,300	29,175,300
Preferred stock	16,183,400	16,183,400	16,957,000	19,671,000
†Common stock	7,400	239,500	153,411,000	147,379,900
*Common stock	*206,456,575	205,393,445	.....	.....
Pur. money, bonds and notes	5,475,593	11,469,070	21,990,000	225,000
Bonus stock awarded	.....	.....	7,848,570	.....
Sub. capital and surplus	1,464,379	1,614,809	1,585,344	3,388,155
Accounts payable	15,640,430	27,160,681	37,846,313	18,453,317
Notes payable	48,974,996	72,421,451	6,812,318	10,802,154
Taxes, payrolls, etc	15,894,779	14,101,796	11,521,771	3,769,865
Preferred dividends accrued	1,043,763	1,018,944	889,882	488,463
Reserve for dep	37,527,775	33,285,988	23,084,824	.....
Reserve for taxes	1,913,194	4,942,116	36,262,473	25,863,823
Special reserve	14,000,000	7,500,000	.....	.....
Reserve for cont., building, etc	6,994,935	6,682,051	4,546,653	3,863,421
Surplus	55,814,160	121,273,217	78,641,897	36,408,937
Total	$515,122,979	$604,806,868	$469,737,345	$299,489,335

†$100 par value. *Represented by 20,550,590 shares of no par value issued and outstanding at $10 per share, and 95,067 shares held in reserve account of subscriptions not fully paid at $10 per share.

New Transport Models

The Transport Truck Company has a new line of trucks ready for distribution to dealers. There is a new Rapid Transport of 1-ton capacity for high speeds, and heavier models which differ from the previous line in capacity and are considerably lower in price. The following table shows the old and new models:

NEW MODELS.		OLD MODELS.	
15, 1-ton	$1,295	20, 1-ton	$1,395
25, 1½-ton	1,495	30, 1½-ton	1,995
35, 2-ton	1,885	50, 2½-ton	2,785
55, 3-ton	2,385	70, 3½-ton	3,885
60, 3½-ton	2,585		
75, 5-ton	3,485		

The rear axle of the Model 15 is of bevel-gear type. On the former line, all models had 8 internal axles. The heavier models still retain this form of final drive.

There are 984 motor express lines in the United States which have been listed at the offices of the National Automobile Chamber of Commerce. The total number of motor express lines in the United States is estimated at 1,500. The tendency each year is toward consolidation, with fewer lines doing a larger business.

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Prices Firmer

Business is now making its improvement felt everywhere. Prices in some quarters are now necessarily advancing toward levels in proper ratio to costs. The downward trend of prices has stopped. Liquidation has spent itself and productive volume is increasing.

Trucks can now be bought with full confidence.

Smith Wheels have stood the test of time, made in three types, Rigid, the Pneumatic and the Cushion. Every Smith Wheel has the full name SMITH appearing on it. It marks the highest quality in metal wheels. They are fast replacing wood and other metal types of wheels. The public now, more than ever before, demands quality represented in dependable service at legitimate costs.

Smith Cushion Wheels solve the big truck problem. They preserve the truck, pavements and highways.

SMITH WHEEL INC
SYRACUSE, N.Y., U.S.A.

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SHARON FRAMES

Sharon engineers and factory men conceive that any motor car or truck will be a better, more serviceable, more saleable car or truck when it is built around a Sharon Frame. They believe that Sharon Quality adds to the life and performance of a Sharon-equipped car or truck. To this end they maintain standards of materials and workmanship which conform with those of the most exacting car or truck builders. And when an order is received for Sharon Frames, every effort of engineering and factory staff is centered upon making those frames just a little better than the customer's specifications require. Let us work with you, in this spirit.

Axle Housings **Axle Housing Covers**

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Running-Boards **Step Hangers**

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SHARON PRESSED STEEL CO.

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Above—Model 21, 2000-pound capacity.
Left—Model S Speed Truck, 1500-pound capacity.

International Service

A Sales-Making Feature

Free Inspection Stops Trouble Before Trouble Stops the Truck

EVERY dealer who sells International Motor Trucks enjoys the heartiest cooperation of the inspection service department. Several times through the year one of our factory-trained road engineers covers each dealer's territory and inspects **every International truck in service.** Recommendations are made, instructions given drivers and owners, and suggestions for the betterment of service taken.

These inspections are usually made in the dealer's service department and a good amount of publicity often attends the occasion. Naturally, prospective truck purchasers are attracted by such whole-hearted supervision of trucks in the field. Thus one of your biggest walls of sales resistance is broken down by a service that is free to both dealer and truck owner.

You can sell International Motor Trucks—the complete line ranges from the 1500-lb. Speed Truck to the 10,000-lb. heavy duty model—and be assured that every truck sold will make a service record that will reflect much credit upon your organization. If your sales and service facilities are adequate to represent properly our high standards we suggest you write or wire for complete details of our dealer contract.

International MOTOR TRUCKS

Eleven Sizes
Capacities as follows:

Model	S,	Speed Truck
Model	21,	2,000 lb.
Model	31,	3,000 lb.
Model	41,	4,000 lb.
Model	61,	6,000 lb.
Model	101,	10,000 lb.

For Low-Cost Hauling

INTERNATIONAL HARVESTER COMPANY

CHICAGO OF AMERICA (INCORPORATED) U S A

92 Branch Houses in the United States

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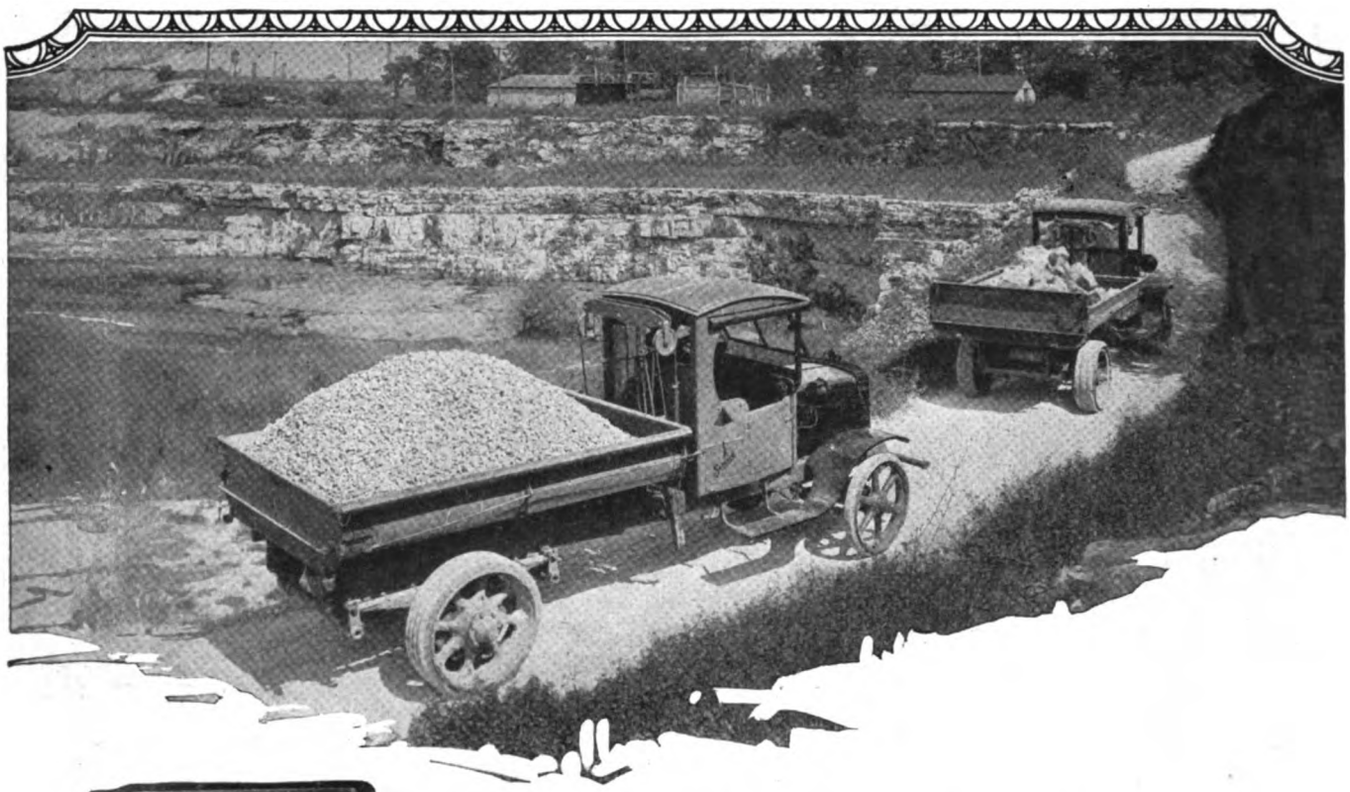

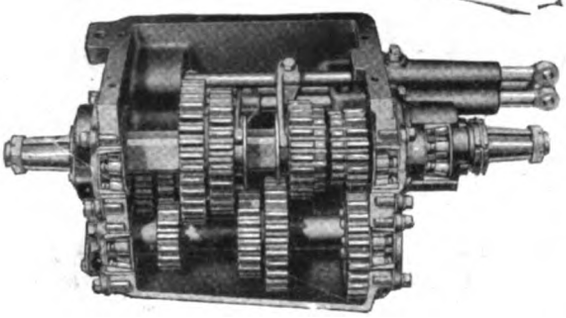

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Hauling crushed stone up a 17% grade and on six to eight 14-mile runs every day, rain or shine, is a job to tax the endurance of all wearing parts.

The first essential for such a perfomance is to keep the trucks on the road all day and every day.

This demands a truck composed of units of unquestioned integrity, and these machines have demonstrated the wisdom of their designers' selections, including Brown-Lipe Gear Transmissions.

Brown-Lipe Gear Transmissions are similarly proving their great strength, durability and smooth operation in a large majority of the highest quality trucks.

BROWN-LIPE-GEAR
TRANSMISSIONS
BROWN-LIPE-CHAPIN
DIFFERENTIALS
Both at Syracuse, N.Y.

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Being convinced that a fabric disc joint within its limitations offers certain advantages, we have supplemented our line of all-metal joints with a corresponding line of fabric disc joints and now offer them for early delivery.

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Pioneer Builders of Universal Joints

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Model 33, 1½-2 Ton Bus

Operated by

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Denby Motor Truck Company
DETROIT, U. S. A.

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The Pierce-Arrow Motor Car Company
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2-ton $3200 3½-ton $4350 5-ton $4850 fully equipped

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1369 Broadway, New York City.
P W.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of The Power Wagon, published monthly at Chicago, Illinois., April 1, 1922.
State of Illinois, County of Cook—ss.

Before me, a Notary Public in and for the state and county aforesaid, personally appeared Walter Wardrop, who, having been duly sworn according to law, deposes and says that he is the business manager of The Power Wagon, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher, The Power Wagon Publishing Co., 544 Lake Shore Drive, Chicago, Illinois.
Editor, Stanley A. Phillips, 544 Lake Shore Drive, Chicago, Illinois.
Managing Editor, None.
Business Manager, Walter Wardrop, 544 Lake Shore Drive, Chicago, Illinois.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)
The Power Wagon Publishing Co., 544 Lake Shore Drive, Chicago, Illinois.
Walter Wardrop, 544 Lake Shore Drive, Chicago, Illinois.
Stanley A. Phillips, 544 Lake Shore Drive, Chicago, Illinois.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)
None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

WALTER WARDROP, Business Manager.

Sworn and subscribed before me this 31st day of March, 1922.
RAYMOND E. OLSON, Notary Public.
(SEAL) (My commission expires March 28, 1923.)

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Gar Wood says:

"Success in building Hoists and Bodies, as well as racing speed boats, depends on correct designing, right materials and painstaking, superior workmanship."

Gar Wood

Built by Gar Wood

From Coast to Coast, and from Border to Border, Wood-Detroit Hydraulic Hoists and Steel Bodies are helping build better roads—are handling sand, gravel and stone better, faster and more cheaply than is possible with any other means.

WOOD DETROIT

There is a type of Wood-Detroit Hoist and a Wood-Detroit Dump Body exactly fitted to every need. Wood engineers, working with the truck makers, have developed the line to cover all branches of industry requiring proven dumping trucks.

Write us of your problem—tell us the size and make of your truck and the commodity you want to handle —and we will quote on the equipment to fit your needs.

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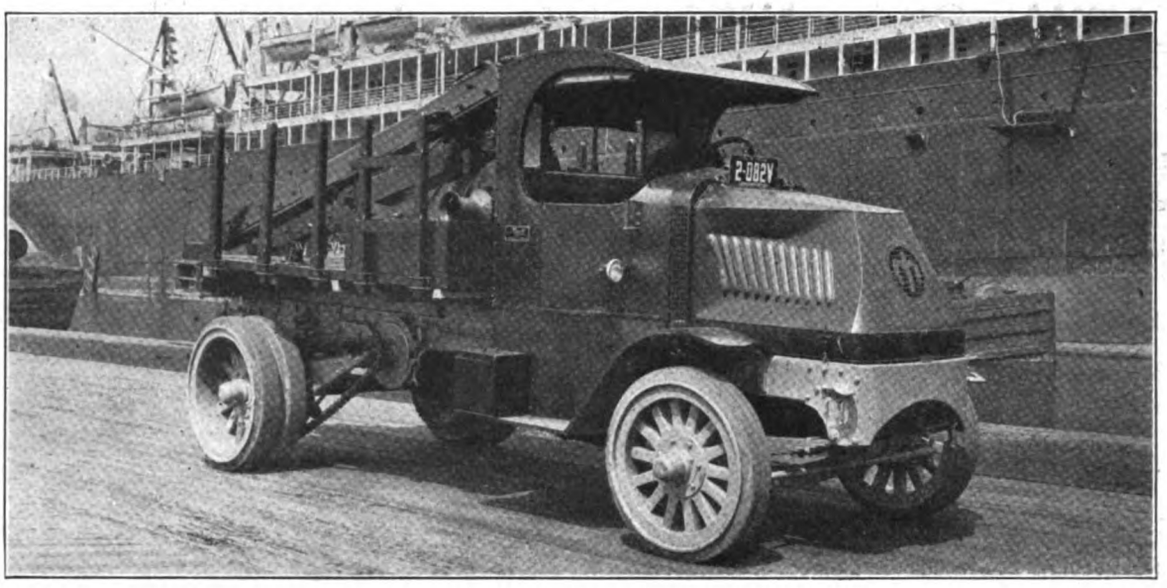

FORESIGHT

Simply another word for common-sense

FORTUNATE indeed are those motor truck owners who, five or ten years ago, had the foresight to select a truck that still holds its position in the mind of the buyer as a quality product.

In normal times, when buyers are in a position to select what they want instead of taking what they can get; prestige, reputation, records and quality are influencing factors in every sale.

There is no motor truck on the American market today that is so universally well-known and as favorably talked about as the Mack truck. It has an unassailable record of twenty-two years of constant development and improvement behind it.

Motor transportation is still in its infancy. Tremendous road building programs are being carried out all over the country. In every community five years from now there will be a fortunate few motor truck dealers who used foresight today by securing some of the mighty promising territory that is still available for handling the Mack truck.

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Branches owned by this Company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

Capacities: 1½ to 7½ tons. Mack TRUCKS **Tractors to 15 tons.**

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LATEST ROLLER CHAINS HAVE SPECIAL QUALITY SOLID ROLLS AND OTHER IMPORTANT IMPROVEMENTS

HIGH EFFICIENCY
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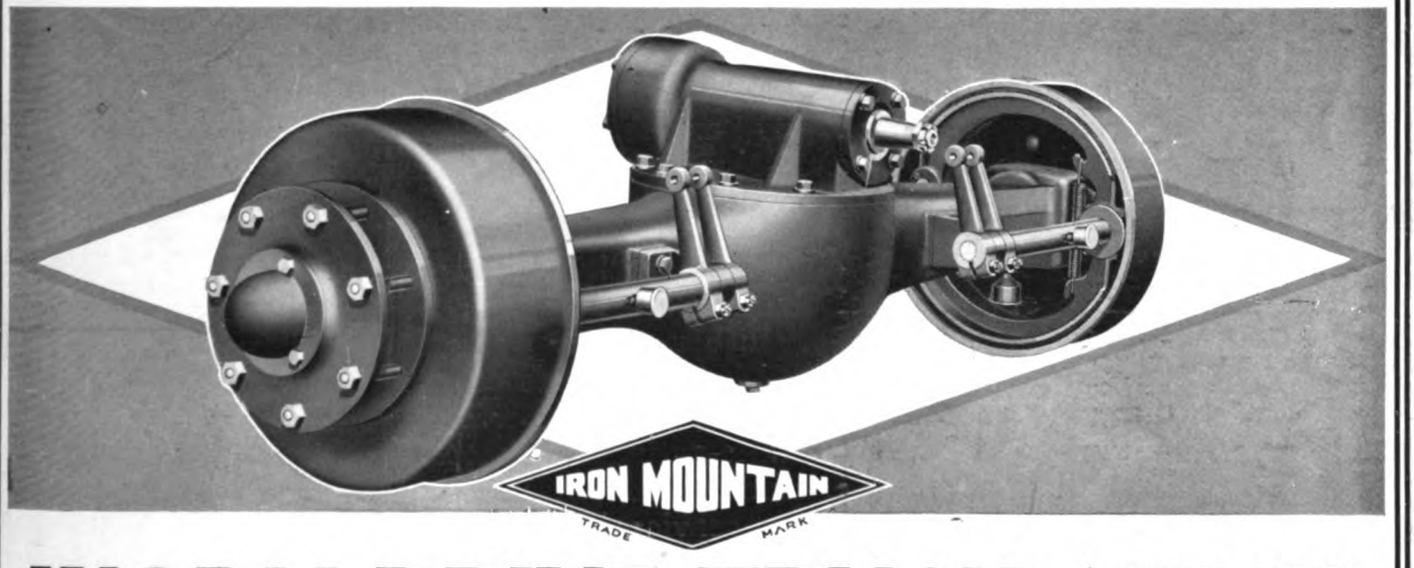
CHAINS
also *Low* Cost per *Thousand Miles* of Service

Front End Motor Chain Drives

EXCEPTIONAL MILEAGE AND NEVER KNOWN TO SKIP THE SPROCKET TEETH

THE WHITNEY MFG. CO.
HARTFORD, CONNECTICUT, U. S. A.



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¾, 1, 1½ and 2½ Tons. Designed Right—Built Right.

Guaranteed to give 100% satisfaction in strength and service. Tell us about your requirements and let us estimate your needs.

IRON MOUNTAIN CO., 927-1001 East Ninety-fifth Street, Chicago

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ANNOUNCEMENT

6 Tons Dumped in 30 Seconds Without Power

TO the famous LEE LINE of motor truck economy equipment has been added a new type of heavy-duty steel dumping body, which operates automatically, instantly, certainly, and without the application of power, which has no pumps, hoists, cranks, toggles or other complicated and unreliable lifting mechanism, and which assures the owner of the highest degree of dependability and economy possible in the design of dumping equipment. It will be available in sizes ranging from 2 to 6 tons capacity.

By eliminating the complications inherent in power-operated dumping bodies an economy in first cost of about 50 per cent. has been made possible, while every advantage of those types has been retained without their disadvantages of excessive weight and unnecessarily high price.

Seven years of development work lie back of this new LEE product, which embodies principles that have been successfully applied to other LEE products and have passed the tests imposed by thousands of users of LEE dumping equipment. The result is a perfect rectangular dumping unit with double-acting tail-gate, providing a high dumping angle, quick action, clean dumping, economy, and freedom from service interruptions—all at a remarkably low initial cost.

Write for full information.

LEE TRAILER & BODY CO.

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NUMBER 211 CHICAGO, JUNE, 1922 Price 25 Cents

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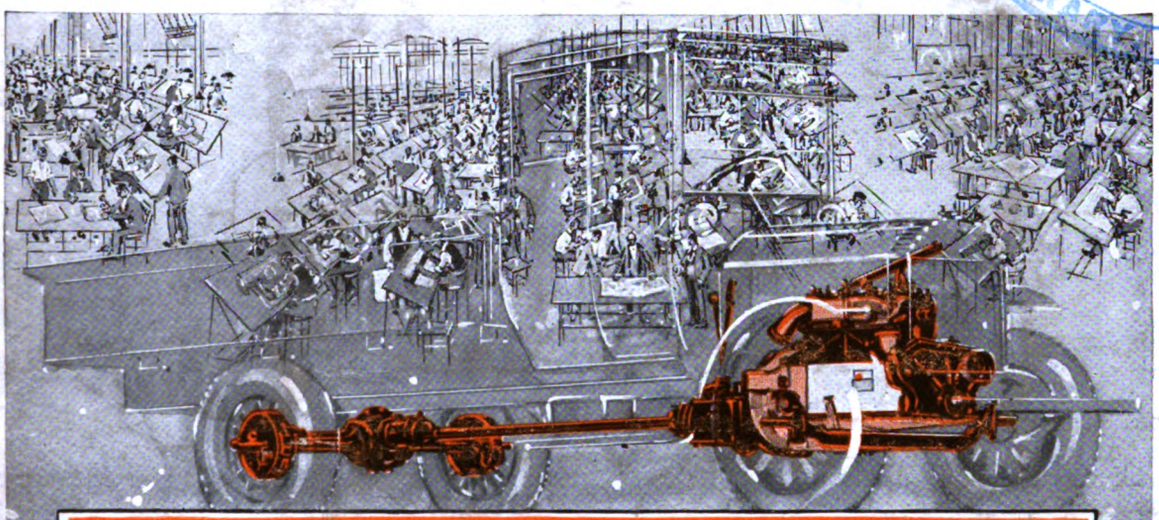


Back of the SPECIALIZED truck

—an engineering force that no one organization could possibly maintain

A few years ago the truck buyer was influenced largely by what he could SEE. But experience has taught him that the things determining performance—real *continuous* performance—are the resources and facilities behind the truck.

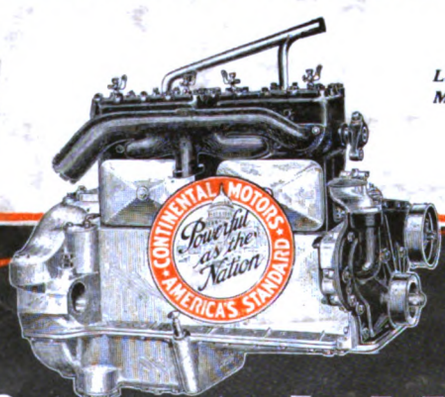
Sales charts show that more and more buyers of trucks are being impressed with the organization back of the genuine SPECIALIZED vehicle—an organization representing the combined strength of the truck builder, the great SPECIALIZED unit manufacturers and the parts-distributing stations that dot the world.

Dealers who ally themselves NOW with the SPECIALIZED motor truck will reap the full benefits accruing from the fast-growing public preference for the truck whose every unit is a *proven* unit sponsored by an organization of SPECIALISTS—such a unit, for instance, as the motor that bears on its crankcase the Continental Red Seal.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, U. S. A.

Factories: Detroit and Muskegon



Largest Exclusive Motor Manufacturers in the World

Continental Motors

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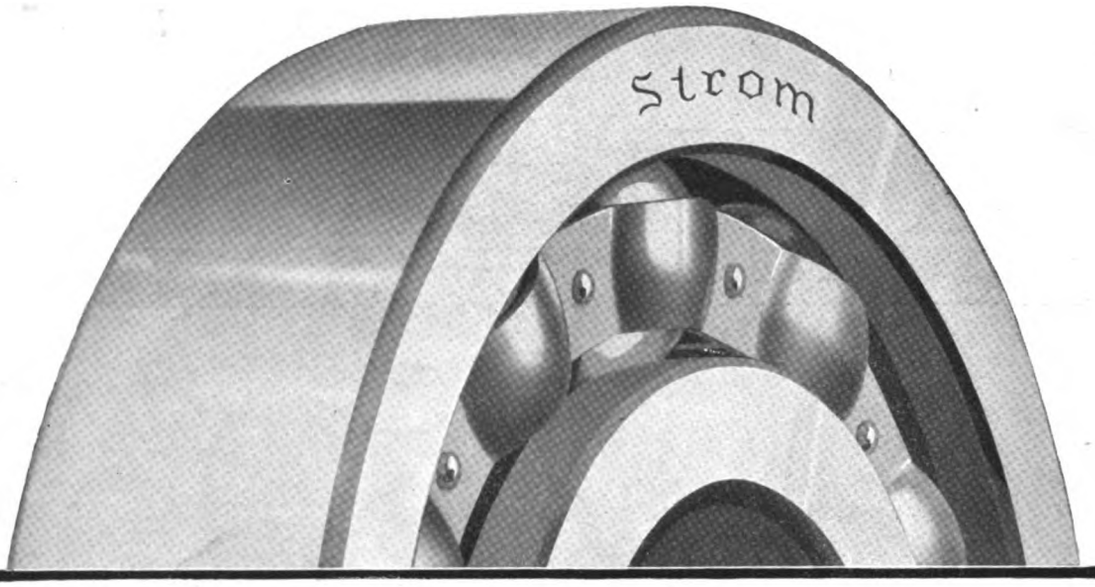

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You Will Find a STROM BEARING *to Fit That Need*

Strom Bearings are made in a wide range of sizes and types with the idea of meeting every bearing requirement.

They are correctly designed—carefully manufactured—thoroughly inspected—with the purpose of giving the highest degree of satisfaction. They are daily proving their serviceability under the most trying conditions in thousands of installations throughout the country.

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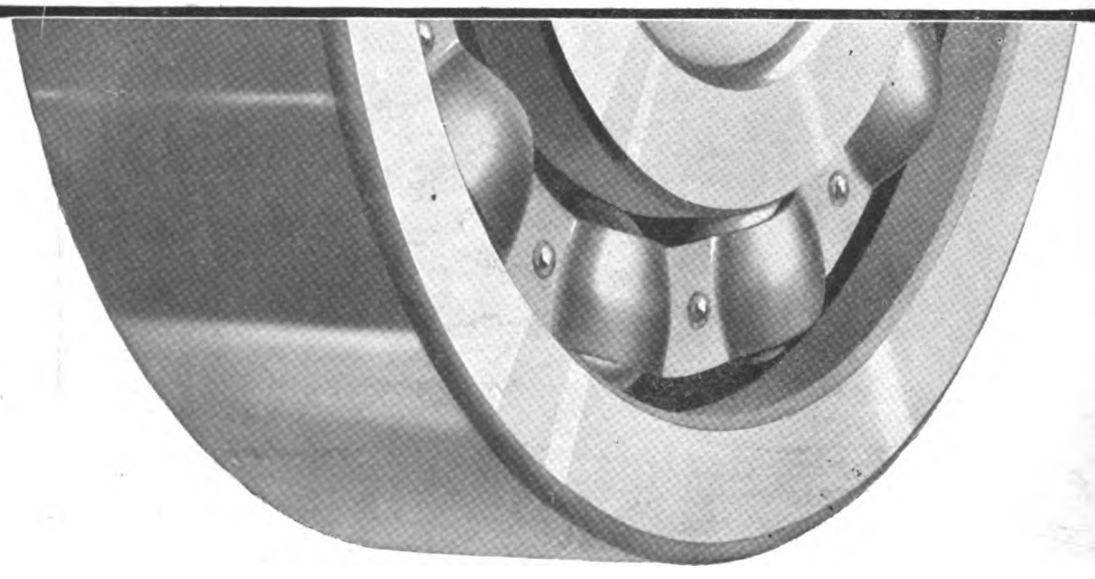
U. S. BALL BEARING MFG. CO. (*Conrad Patent Licensee*), 4541 Palmer Street, CHICAGO, ILL.



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MANUFACTURERS
PHILADELPHIA
U·S·A

BACKED by the strongest of resources—resources in engineering knowledge, manufacturing equipment and service facilities—and directed by an organization of aggressive executives, VIM TRUCKS now offer the progressive dealer a most attractive opportunity for building a PERMANENT truck business.

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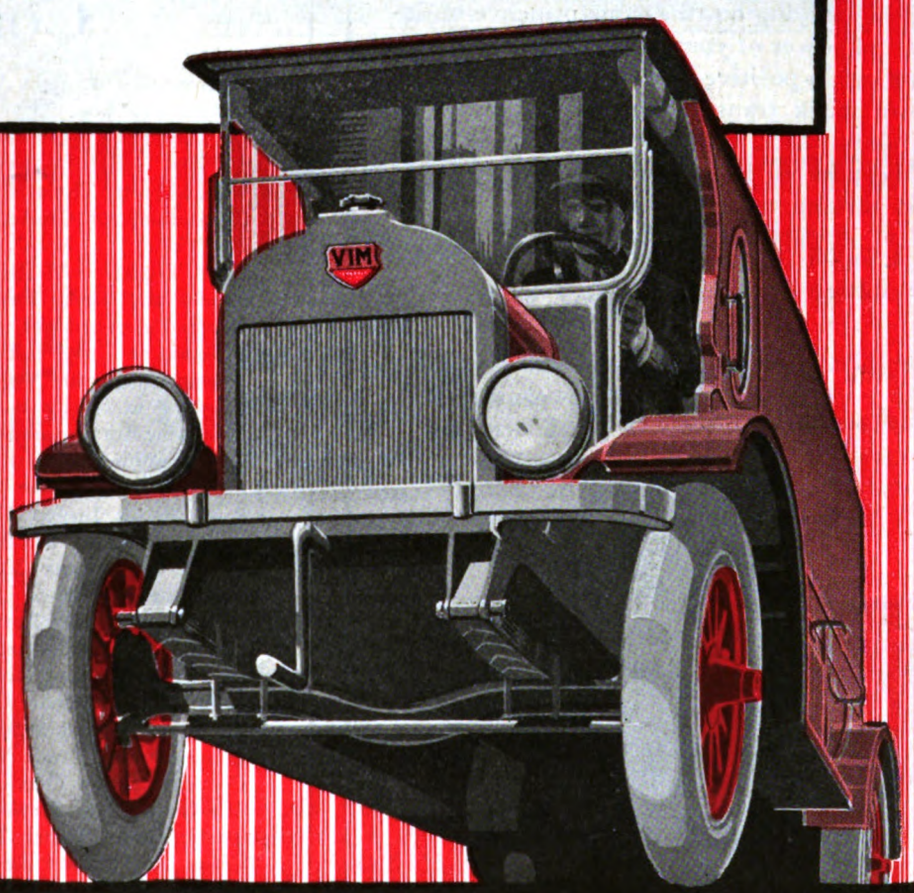

VIM
Motor Trucks

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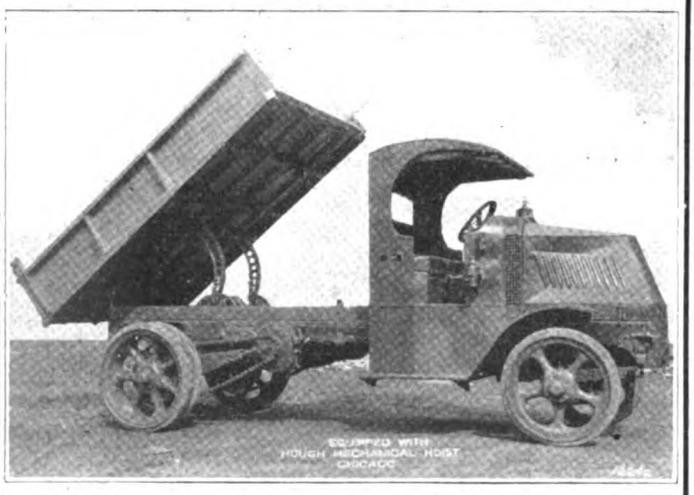
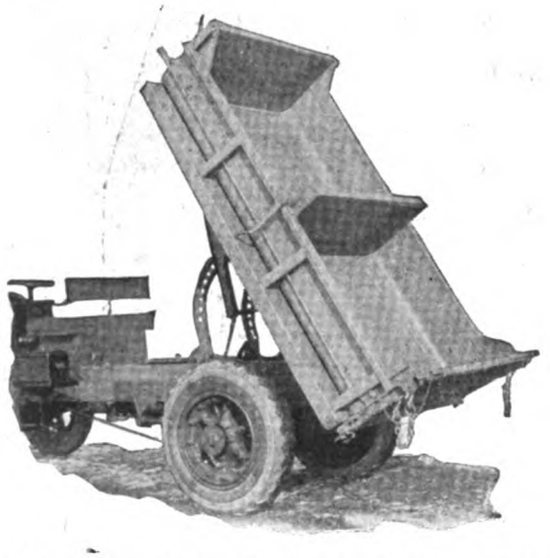


Hough Mechanical Hoist

installations become an integral part of your truck unit, carrying out the same principle of delivering the power of your motor in elevating the body through a positive gear drive identical with your own truck transmission. There being **no** oil cylinders, check valves or oil pumps. Nothing to be affected by dirt or grit, **no** valves to leak, **no** packing to become loose.

Hough Hoists boost everything but the repair man's profits.



The high dumping angle designed for road building units is an exclusive feature with Hough Hoists.

Built in three sizes, fits any make of truck.

3 Ton — 6 Ton — 10 Ton

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

Published monthly by

THE POWER WAGON PUBLISHING COMPANY

544 Lake Shore Drive, Chicago, U. S. A.

Entered as second-class matter December 2, 1907, at the post office at Chicago, Illinois, under the Act of Congress of March 3, 1879.

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THE POWER WAGON PUBLISHING COMPANY

WALTER WARDROP, *President and General Manager*
STANLEY A. PHILLIPS, *Vice-President and Editor*

Executive and Editorial Offices, 544 Lake Shore Drive, Chicago.

W. C. COFFEY, Eastern Representative

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Above—Model 21, 2000-pound capacity.
Left—Model S Speed Truck, 1500-pound capacity.

International Service

A Sales-Making Feature

Free Inspection Stops Trouble Before Trouble Stops the Truck

EVERY dealer who sells International Motor Trucks enjoys the heartiest cooperation of the inspection service department. Several times through the year one of our factory-trained road engineers covers each dealer's territory and inspects **every International truck in service.** Recommendations are made, instructions given drivers and owners, and suggestions for the betterment of service taken.

These inspections are usually made in the dealer's service department and a good amount of publicity often attends the occasion. Naturally, prospective truck purchasers are attracted by such whole-hearted supervision of trucks in the field. Thus one of your biggest walls of sales resistance is broken down by a service that is free to both dealer and truck owner.

You can sell International Motor Trucks—the complete line ranges from the 1500-lb. Speed Truck to the 10,000-lb. heavy duty model—and be assured that every truck sold will make a service record that will reflect much credit upon your organization. If your sales and service facilities are adequate to represent properly our high standards we suggest you write or wire for complete details of our dealer contract.

International MOTOR TRUCKS

Eleven Sizes
Capacities as follows:

Model	S,	Speed Truck
Model	21,	2,000 lb.
Model	31,	3,000 lb.
Model	41,	4,000 lb.
Model	61,	6,000 lb.
Model	101,	10,000 lb.

For Low-Cost Hauling

INTERNATIONAL HARVESTER COMPANY
OF AMERICA
(INCORPORATED)
CHICAGO U S A

92 Branch Houses in the United States

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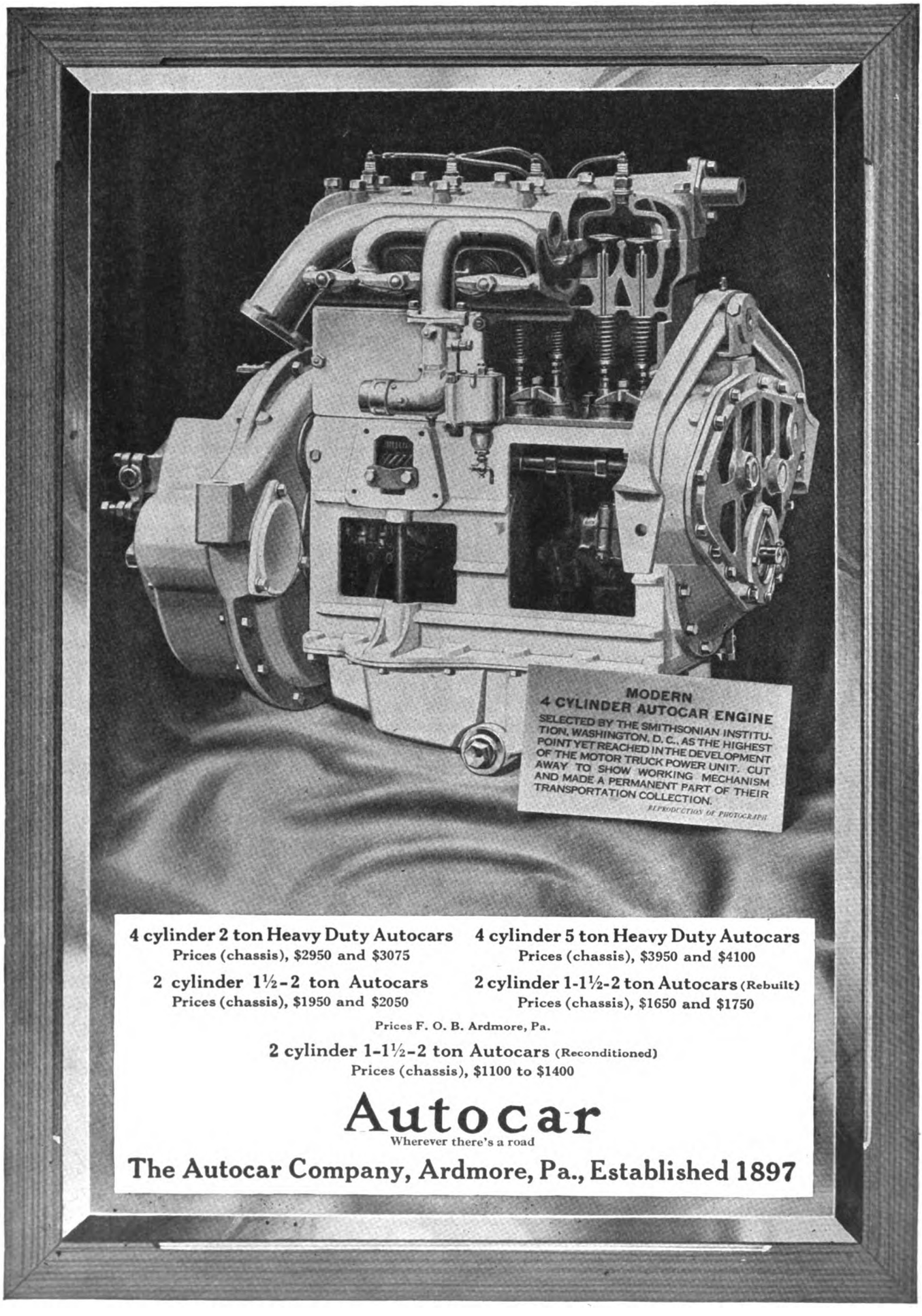
MODERN
4 CYLINDER AUTOCAR ENGINE
SELECTED BY THE SMITHSONIAN INSTITUTION, WASHINGTON, D. C., AS THE HIGHEST POINT YET REACHED IN THE DEVELOPMENT OF THE MOTOR TRUCK POWER UNIT. CUT AWAY TO SHOW WORKING MECHANISM AND MADE A PERMANENT PART OF THEIR TRANSPORTATION COLLECTION.
REPRODUCTION OF PHOTOGRAPH
4 cylinder 2 ton Heavy Duty Autocars
Prices (chassis), $2950 and $3075
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Prices F. O. B. Ardmore, Pa.
2 cylinder 1-1½-2 ton Autocars (Reconditioned)
Prices (chassis), $1100 to $1400
Autocar
Wherever there's a road
The Autocar Company, Ardmore, Pa., Established 1897

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POWER WAGON

Vol. XXVIII. CHICAGO, JUNE, 1922. No. 211.

Railroads Defeated in New Attempt to Block Motors

CALIFORNIA COMMISSION GRANTS PER

The application of the Hodge Transportation Company of Los Angeles for an operating permit as a common carrier has been granted by the State Railroad Commission of California after one of the hardest fought battles between the railroads and the motor interests. In support of the applicant's claim for a permit representatives of the California Walnut Growers' Association, the California Fruit Growers' Association, Charles Stern & Sons, the Agricultural Chemical Works, the Fruit Growers' Supply Company, the California Growers' Association and others testified to the superior service offered by the motor operators. The railroads which opposed the granting of the permit were the Southern Pacific, Santa Fe, Salt Lake and Pacific Electric roads, which claimed that existing facilities were adequate. Other motor operators also protested against the proposed permission.

Under the permission granted the company it is limited to handling products of agriculture and commodities necessary to the production and distribution of such products, the minimum weight of any shipment being fixed at 3 tons. The permit does not call for regular scheduled operation but for hauling on request.

"We are of the opinion and find as a fact that the applicant produces a service that is required by the public convenience and necessity in that an expedited service for quantity shipments is offered and that such service has heretofore been rendered by applicant in considerable volume and has satisfactorily met the requirements of the shipping public," the commission said. "There is no evidence before the commission indicating that any carrier operating herein as protestant has heretofore satisfactorily met the demand for expedited service as furnished by applicant, for which authority is now requested.

"The rates proposed by the applicant are in the great majority of instances higher than those proposed by existing carriers either by rail or motor truck, and the basis for such higher rates is the superior expedited service which has been rendered."

Traffic Joins Merger

At a special meeting of stockholders of the Traffic Motor Truck Corporation, St. Louis, held on May 20, the plan calling for the transfer of all the assets to the Associated Motors Industries, Inc., was ratified. The latter organization assumes all liabilities. The Traffic company gets stock in the Associated Industries consisting of approximately 7,600 shares of 8 per cent. preferred cumulative stock of $100 par value and 19,400 shares of common without par value.

April Vehicle Shipments High

Reports from factories which produce approximately 85 per cent. of all motor cars and trucks indicate that April shipments reached a total of 30,200 car-loads, 22,500 drive-aways, and 3,200 boat shipments, according to the National Automobile Chamber of Commerce. On this basis it is estimated that 213,000 passenger-cars and trucks were produced by all makers in April. This would be an increase of 35 per cent. over April, 1921, and 24 per cent. over March, 1922. Last year April production increased 43 per cent over March.

The heaviest shipping previously recorded was in March, 1920, when 29,326 car-loads and 57,273 drive-aways and boat shipments were made, and approximately 220,000 cars and trucks were turned out. Thus April, 1922, appears to have set a record for rail shipping, due to more adequate car supply, and second in number of vehicles produced in one month.

Factory shipping figures for all manufacturers for four months this year compared with corresponding months in 1921, follows:

	Car-loads.		Driveaways.		Boat.	
	1922.	1921.	1922.	1921.	1922.	1921.
April	*30,200	20,187	*22,500	14,197	*3,200	1,619
March.	27,380	16,287	16,766	9,939	560	75
Feb. .	19,636	9,986	10,173	7,507	180	99
Jan. ..	15,357	6,485	7,479	3,185	143	93

*Partly estimated.

Pierce-Lafayette Merger Off

Negotiations surrounding the proposed merger of the Pierce-Arrow Motor Car Company and the Lafayette Motors Company have been abandoned for the reason that one of the bankers who was to help in the financial arrangements demanded a higher rate of interest than the others were content with. The status of both concerns, therefore, remains unchanged, the proposal never having gone even far enough to be submitted to the stockholders of the firms involved.

Huge Merger of Truck, Car and Parts Makers Growing

TRAFFIC TRUCK COMPANY ALREADY IN

The proposed merger of truck, car and parts makers to be known as the Associated Motors Industries, Incorporated, described in these columns in February last, is in full working order although still incomplete, and most of the concerns then considered as likely members have been taken in or are about to be united with those already embraced in the new company. The combine is capitalized at $80,000,000 under the laws of Delaware, and C. L. V. Exselsen, secretary and treasurer of Jackson Motors Corporation, and W. W. Sterling, vice-president of the same concern, have generally been credited as being the moving factors, although R. A. Crandall, formerly of the Bankers' Commercial Company of New York, and R. V. Board, president of the Kentucky Wagon Manufacturing Company of Louisville, have been active in promoting the project.

In general, the proposal provides for the sale of all the property and assets of each member company to the merged organization, payment to be made either in stock and bonds of the new organization, in cash, or in both. The proposal as made to one member now in the hands of its creditors involved the payment to the newcomer of $125,000 in cash; first mortgage gold 7 per cent. bonds of the Associated Motors Industries, Inc., which at 90 per cent. of par will equal the sum of $550,000; unsecured 7 per cent. notes, due on or before one year from date in the aggregate amount of $250,000; and underwritten shares of 8 per cent. of cumulative preferred stock of the same corporation calculated on a valuation of 80 per cent. of par in an aggregate amount equal to $125,000; these shares to be accompanied by a bonus of 1,042 shares of no par value common stock of the corporation. As further consideration the Associated Motors Industries agrees to deliver shares of its 8 per cent. preferred stock in a par value equal to 70 per cent. on the net tangible assets actually conveyed and further, in addition, its no par value common stock (figured on a valuation basis of $50 per share) in an amount also equal to 70 per cent. of the net tangible assets actually conveyed. "Net tangible assets" is defined as the difference between the total tangible assets, both fixed and liquid conveyed by the member company and the amount of $1,050,000 of liabilities assumed by the Associated Mo-

(*Continued on page 7.*)

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Parts Business Very Good During the First Quarter

SOME FIND TRADE BEST IN TWO YEARS

A survey of the automobile industry during the first quarter of 1922, made public by the Motor & Accessory Manufacturers' Association, indicates marked but steady increases in production and a general betterment in fundamental financial factors.

The upward swing of sales in January, February, and March was sharper than the normal seasonal jump for this period of the year. Preliminary figures for April promise a continued increase in purchases by vehicle makers from the parts and unit manufacturers.

M. L. Heminway, general manager, and Sidney S. Meyers, general counsel, Motor & Accessory Manufacturers' Association, have just returned from a tour of the Middle West. They report that, in general, manufacturers are running behind their orders. Many factories are employing two shifts. A great deal of this activity, naturally, is purely seasonal, but the improvement in credit conditions is more fundamental than that.

Nobody is talking of a feverish boom, but almost everybody is face to face with genuinely good and progressively better business. There is enough optimism about to justify a note of caution. The industry's experience of two years ago is still a stern schoolmaster. A rigorous liquidation process has left the trade in a sane and virile condition, dynamic enough for sound and steady advances, without being reckless enough for an unbridled and hectic runaway market.

Past due accounts reported by parts and equipment makers decreased more than 8 per cent. in February and approximately 28 per cent. in March. Equally encouraging is a 23 per cent. drop of notes outstanding in March.

About three hundred representative executives are of the opinion that financial conditions in the automotive industry are not only gratifyingly better today than they have been in almost two years, but also indicative of a steady improvement for the rest of 1922. Through monthly meetings for the interchange of credit information, unit and equipment manufacturers in Detroit, Cleveland, Buffalo, and Indianapolis districts have pooled their experiences in an effort to obtain an impartial and accurate view of current conditions and prospects. The following quotations are candid, first-hand views of executives in close touch with conditions:

"For the first time in two years we have all our units in operation, and also for the first time since we have had a roof over our heads we had to tell one of our customers last week that, if he did not get his units within seven days, he would not be able to get them for over a month."

"Our collections are very, very good. I don't believe there has been any time in the last two or three years that our accounts have been in better shape than they are now. We are doing, I should say, about 15 per cent. more business now than we did this time last year. While we don't exactly know how to figure out the summer, we feel that we will slow up to a certain extent this summer."

"Our business has gone beyond our expectations. Releases have been coming in very, very well. In fact, we have not been able to take care of them, and will not be able to live up to some of the agreements we have made the first of the month. Collections have been exceptionally good."

"Last month brought us a great many releases on old contracts, so that we are running about 60 per cent. of what has been our former capacity. We believe that this busines will hold through the greater part of the summer, probably increasing rather than decreasing. That is all automobile business."

"The business situation with us is particularly good. Our sales for the first quarter of the present year are over 100 per cent. in excess of what they were for the corresponding period last year, and the present month shows a substantial improvement over March. We are booking a nice lot of business at the present time. We are being crowded very hard by the manufacturers for special material. There has been a tendency to order in smaller quantities than usual and then drive us very hard for deliveries."

"Business conditions with us seem very satisfactory. Each month we have been running over the previous month for this year, and at the present time we are running day and night to keep up with our orders. Collections seem to be very satisfactory. Our main trouble is getting skilled labor. We don't seem to get the kind of labor we want down here."

"We are operating one plant about 100 per cent. and the other plant approximately 75 per cent. Our sales have just about doubled what they were last month. April will just about double March and for the quarter I should say it will be nearly double. Collections are satisfactory and notes are being paid. We have no realease over 30 days' ahead; short orders."

"Orders for March are about 30 per cent. ahead of February and about 40 per cent. ahead of March of last year. Our collections are good. We are having scarcely any notes offered to us now and notes upon which customers have previously asked for partial renewals have now been paid right up and those customers are offering us more notes. Our productive capacity for March is running about 80 per cent. against 60 per cent. a year ago. We have obtained some releases, but they usually run only about a month to six weeks' ahead."

New 1-Ton Truck

A new Cleveland Tractor Company, to make a 1-ton truck in addition to the Cletrac tractor, will be organized as a subsidiary of the recently formed Allyne-Zeder Motors Company, which has displaced the old Cleveland Tractor Company. The new truck has been designed by Rollin H. White.

Utilities Body Condemns Road Damage by Trucks

OWNER MUST SHARE IN ROADS' COST

Declaring that motor stage operators have no right to convert to their own profit the money paid by tax-payers for the construction and maintenance of highways, the Public Utilities Commission of Colorado has handed down a momentous decision which will from a precedent for decisions in similar cases by other state public utilities commissions. The Colorado commission made an investigation of the transportation conditions in Eagle and Garfield Counties, through which the 'bus lines wish to operate, and found that in the two counties, although there were 68 motor trucks operating as public carriers, they paid into the state treasury only $819 per year for use of the state and county highways. The Denver & Rio Grande Western Railroad, which these 'buses parallel, paid during the same period $38,023 for the public roads they do not use at all, say the railroads, and in addition, other taxes, making the total paid in these two countries by the railroad company $153,896.

The portion of the decision which is of special import is that defining "public convenience and necessity" which is as follows:

"Public convenience and necessity, by which must be understood the convenience and necessity of the people at large as contradistinguished from the convenience and necessity of a very small number of persons who seek to derive a profit from the farmers' and home owners' investment in roads, never contemplated that the truck driver should destroy that, to the cost of construction of which he contributed little or nothing, or that he should reap where he has not sown. When the taxing laws of this state are so amended that the truck driver operating over state highways shall contribute his due proportion to the cost of construction and maintenance of our highways, then, and only then, can this commission regard his use, under proper conditions and restrictions, of a great and tremendously expensive public facility as of equal dignity and equal benefit to the people with the moderate use thereof by the ordinary tax-payer."

Lincoln Highway Progress

The states and counties traversed by the Lincoln Highway expended $7,730,000 in new construction on that route in 1921. The following table shows the mileage of each type of construction completed last year, the total being 12 per cent. of the mileage between the two coasts:

Type.	Miles.
Concrete	99.51
Brick	21.35
Bituminous macadam	5.83
Gravel	174.85
Sand clay	4.25
Permanent earth grade	91.77
Total	397.56

The total mileage of improved sections of the Lincoln Highway at the end of 1921 is 3,305 miles.

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Massachusetts Threatens Trucks of Over 5-Ton Size

MAY BAR THEM BY NEW WEIGHT LIMITS

The State of Massachusetts is considering setting a limit of 20,000 pounds to the weight of the motor truck, including its load, as a matter of road preservation, James W. Synan of the Massachusetts Highway Commission declared in addressing the annual meeting of the National Highway Traffic Association in New York City recently. This would exclude from bay state highways trucks of more than 5-ton capacity, and might even bar some of that size except when loaded to less than capacity. The matter is being seriously considered.

Mr. Synan said that an extensive plan of road rebuilding was under way in his state, but, as it would take several years for the best type of roads to catch up with existing highway transport conditions, it might be necessary to reduce the present legal weights until the state roads could sustain the steadily increasing heavy traffic. At the last legislative session New York increased its motor truck load maximum from 25,000 to 28,000 pounds, which is the weight advocated for uniform adoption throughout the country.

George H. Pride, president of the Heavy Haulage Company, presented to the meeting a report on size and weight limitation containing the 28,000-pound recommendation. The report suggests that the maximum specifications be: Length, 30 feet; width, 96 inches; height, 12½ feet; axle weight, 22,000 pounds; total weight for truck and load, 28,000 pounds; sped for the lightest vehicles, 15 miles per hour in country, 20 miles in the city, and for the heaviest vehicles, 15 miles in both city and country.

There has been an extreme laxity in many states in enforcing the load limit and motor truck users have taken such advantage of this official carelessness that, in a recent survey of traffic on Connecticut roads under the auspices of the Federal Bureau of Public Roads as described elsewhere in this issue, it was found that one truck in three was loaded beyond its proper capacity. The New York officials have suddenly aroused themselves to this road menace and in several localities wholesale arrests followed by 25 fines have been made. The wheel-load of the truck is taken on the road and, if exceeding the legal requirement, the penalty follows. Under the new law all motor trucks must carry a plate giving its maximum weight capacity, and the state officers have the power to compel the driver to throw off the excess weight on the side of the road.

T. G. Meachem, president of the Van Wheel Corporation of Syracuse, New York, has just announced the appointment of Leon L. Kinstler as sales manager. Mr. Kinstler was for several years U. S. automotive inspector in charge of inspection and acceptance of the government's automotive engineering work and has a wide acquaintance among truck and passenger-car manufacturers.

Huge Merger Growing

(*Continued from page 5.*)

tors Industries, Inc. Prior to the notice to stockholders, creditors of the member company were asked to consent to its absorption in this way. They were offered 10 per cent. of their claims in cash, 25 per cent. in one-year notes, 15 per cent. in bonds and the remaining 50 per cent. in preferred stock of the Associated industries.

When the merger was first talked of last fall fourteen more or less prominent makers of trucks, cars and parts in the Middle West were mentioned as probable members of the new group, and there was some thought, it is said, of making the merger a territorial factor in production, discontinuing some of the brand-names represented and utilizing the various plants taken in in the most effective manner for economical production on a large scale. The merger is now known to include, among possible others, the Traffic Motor Truck Corporation of St. Louis, the Jackson Motors Corporation of Jackson, Michigan, and the Kentucky Wagon Manufacturing Company of Louisville. The National Motor Car & Vehicle Corporation of Indianapolis is considering the prospects of consolidation with the new body, and other concerns whose names have been mentioned in that connection are the Covert Gear Company of Lockport, New York; the Hershell-Spillman Company of North Tonawanda, New York; the Peru Auto Parts Company of Peru, Indiana; and the Saginaw Sheet Metal Works of Saginaw, Michigan.

April Motor Vehicle Production

Reports received by the Department of Commerce show a further increase in the production of motor vehicles during April. New records were made for the output of both trucks and cars, compared with the preceding ten months for which figures are available.

With the reports lacking for only a few small companies, the total April production of trucks totaled 21,944 machines, compared with 19,449 from the same firms in March, while that of passenger-cars amounted to 196,512, or an increase of nearly 30 per cent. over the March production of the identical firms.

The following figures give the production for identical firms for the past four months. A few firms have not yet reported for April, hence the figures for the earlier months are slightly less than the totals previously given.

1922.	Trucks.	Passenger-Cars.
January	9,204	81,638
February	12,968	109,039
March	19,449	152,647
April	21,944	196,512

Wants Better Truck Data

The National Motor Truck Committee of the National Automobile Chamber of Commerce has referred to the board of directors a memorandum urging better methods of collecting statistics on motor trucks. The compilations desired would cover distribution in counties and states and quantity reports on shipments among other figures. The committee feels that present lists are not always "entirely accurate."

Suggestions for Greater Safety on Public Roads

WIDER PAVEMENTS AND EASIER CURVES

Ten recommendations which, if followed out, would make for greater safety on highways were presented before the National Highway Traffic Association's conference in New York city May 12 by H. Eltinge Breed as chairman of the Committee on Status of the Construction of Highway Curves and Recommended Practice to Increase Safety of Traffic. Last year the Committee made a report on progress in gathering data on which to build its final report, the findings of which are embodied in these suggestions. They are as follows:

1. That on all curves of more than three degrees the pavement and inner half or the earth shoulder be banked. This super-elevation should vary from zero for a 3-degree curve to one inch per foot of width for curves of 20 degrees or sharper.

2. That on all curves of more than 4 degrees the pavement be widened on the inside one-half foot for each degree of curvature.

3. That a white line be painted on the center line of pavement on all curves.

4. That all sharp or dangerous curves and railroad and grade crossings be posted with signs shownig the direction of curvature.

5. That driving past another motor vehicle going in the same direction on a curve where vision is under 500 feet be made a state offense punishable as a misdemeanor.

6. That, unless impracticable, the minimum radius of curves be 300 feet.

7. That earth slopes be carried out 4 to 1 unless impracticable in which case a guard-rail be erected.

8. Special preparation of shoulders adjacent to pavements to prevent "gouging out."

9. That all advertising and other signs and obstructions be eliminated except the 500-feet danger signs.

10. That a sum be set aside each year by state and county highway departments to be used in the elimination of dangerous grade crossings.

In addition, the committee set up for discussion suggestions that (a) proper highway officials in each community make a survey of bridges to determine how they can be strengthened to support growing traffic; (b) building parallel routes to relieve congested highways; and (c) the question of grade separations for intersecting crossings where traffic is heavy.

The conference also heard the reports of the Uniform Highway Signs, Traffic Capicity and Widths of Highways Outside Municipalities, Highway Transport Clearing Houses and Highway Improvement Creed Committees. Arthur H. Blanchard, president of the association, who precided, responded to the address of welcome given by Col. Arthur Woods, president of the Automobile Club of America.

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What of Distribution?

EVERY trade or profession with which we are at all familiar suffers from the evils of overcrowding, and the business of making and selling motor trucks—as we have frequently pointed out—is no exception. Indeed, we should not hesitate to say that it presents, especially in the field of distribution, one of the most horrible examples of multiplication and wastefulness of effort, of distorted industrial vision, of destructive competition and needlessly imperilled investment that could be discovered in a month's seeking. On the selling side the truck business is so badly sprung out of practical and workable proportions, having regard now to the possibilities that the market affords as demonstrated by the experience of the last decade, that only the most courageous thinking and action can avail to bring it within the bounds fixed by common sense.

This is not the alarmist cry of the confirmed pessimist; it is the reasoned conclusion of those who have watched and studied the development of this trade for nearly twenty years. The distributing branch of the truck industry is many times as large, weighed by the number of factors in it, as it ought to be for distribution of the product that has been or can be moved by it; it is growing from year to year at a speed that is truly dangerous, if the future stability of this industry is of any consequence; and it threatens to expand still further in the future and at an even greater rate of acceleration, unless some methods of wholesome restraint are devised and applied. And all this for no apparent reason other than the fact that the truck-selling business is generally believed to be one of unlimited possibilities, in which every Tom, Dick and Harry, without experience, without knowledge, without genius, nay, even without capital, can embark on the road to fortune with very good prospects of achieving success. In short, the distributing system of this industry is largely of the nature of a bubble which, unable longer to withstand the ever-increasing internal pressure of unwarranted expansion, must inevitably burst, with disaster to the bubble and serious shock to the surrounding atmosphere.

No empty simile or strained hyperbole, this. The truck industry "boasts" of a distributing system embracing nearly 24,000 dealers engaged in the business of retailing motor trucks, and at no time, save during the "boom" years of 1919 and 1920 when trucks were bought not sold, has this swarm of commercial frontiersmen been called upon to dispose of more than 150,000 trucks in a single year. That is to say, for every six or seven trucks produced for domestic consumption, assuming that they could be evenly distributed according to dealer representation, there has been at least one organization attempting to sell them. But, since the big markets absorb a much larger number of machines per dealer, the small-town agent, it is evident, is faced with the alluring prospect of selling even less—on the average, between one and two vehicles a year.

In hundreds of out-of-the-way, unheard-of, insignificant towns and villages—some of them with populations below the hundred-mark or, say, twenty families, and not a prospective truck buyer within gun-range—the great bulk of the industry's dealers have been appointed; hopeful, uninformed and misled men, dignified with the title of motor truck dealer, left to shift for themselves in a barren field, and expected to introduce machine haulage in a territory where transportation is conducted on the scale of the pack-mule and one-horse wagon. And there they remain, changing their lines from year to year or oftener in the search for a "fast-selling" truck (not knowing where the difficulty lies), asking ridiculously low prices in order to salvage their investment, inventing unstable professional haulage contracts to stimulate time-payment sales that are never completed—all the while, by the sheer weight of their numbers, misleading truck makers into believing that production must be advanced to meet the pressing demand of the "great unsold."

And even in the largest markets of the country the situation is not much different, except that a genuine demand exists and can be measured. In the great centers of truck use, where "prospects" are dreamed of as without number (although the extent of their transportation needs can be calculated to a hair's-breadth, if one would but take the trouble), even here, where truck-selling has been going on for nearly a score of years and where experience has certainly ruled with a sterner hand, the lesson of inflation has not been learned. In every city of prominence one can find many more truck dealers than can possibly exist out of truck sales; sometimes one dealer for every ten "prospects," sometimes more for even fewer. Everyone who has had any experience with the Chicago market—to cite just one example—knows that there are too many dealers making a bid for its favor, that they can not all sell on a profitable basis, that the pressure of competition breeds every kind of commercial evil that is destructive of the good opinion of the buying group. Yet, in proportion to population, St. Louis has twice as many dealers, Pittsburgh nearly four times as many, Newark five times as many, Atlanta nine times as many, and Norfolk fifteen times as many, with more than eighty cities of importance ranking between the two extremes. In fact, there are only two cities of more than 75,000 people that relatively have fewer dealers than Chicago.

Now surely this is absurd; surely fancy has run riot with reason here, when an industry can allow itself to be deluded by such a system and yet be painfully aware of the results it necessarily entails. And what are the results?

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Just these: That, of the 24,000 factors reputed to be truck dealers, less than a fifth have a financial rating that would warrant a good line of credit; that prices are slashed down to and even below the level of wholesale costs; that second-hand machines of low value are accepted in trade for new product at figures that dissipate all chance of profit; that trucks are regularly missold and misapplied; that all the decencies of clean business are utterly forsaken, first by the weak and supernumerary who embrace any method that appears to avoid impending failure, and then even by the few strong and essential ones who, through the irritation of such harassing rivalry, are driven to adopt, on the plea of meeting competition, all the destructive and malicious practices that they would normally condemn. How can an industry that knows itself encourage the overcrowding that produces such results and then complain of the inevitable outcome? How can a manufacturer who takes a serious view of the business and its future establish an agency connection in a place where there is not the slightest chance of making a sale and then bewail the inactivity of the dealer? How can any business expect to build up a virile, successful and permanent agency system while countenancing and practicing the methods that make for loss instead of profit?

It is not enough to know that dealer mortality everywhere exceeds dealer birth-rate and to hope that, because of this apparently satisfactory state of affairs, there is no cause for apprehension. A man may, it is true, court the risks of financial ruin since the danger may presumably be his alone (although even here it is doubtful if he is warranted in becoming a charge upon society), but he certainly has not the right to invite a disaster that, in addition to extinguishing himself, brings loss and trouble to his contemporaries. We can not, however, expect the offenders in this particular to be their own accusers and executioners; it will not do to leave the settlement of this grave problem to those who, even were they gifted with sufficient knowledge to protect themselves, would not be likely to exercise their talents for the improvement of the business which they have sought to exploit. The remedy lies in the hands of the solid fabric of the industry, dealer as well as manufacturer. These must recognize the obligations they have for aiding in their mutual protection and support against the ravages of the common enemy, and both must work together for the stabilization of the business as a whole through the discouragement and elimination of the weak and parasitically destructive elements in manufacture and sale.

The Competition Is Real

THERE is some danger, in our opinion, that the phrase "motors and railways are not really competitors"—so often and glibly handed about by railway men who have been forced to recognize the great virtues of motor transport—may become one of the aphorisms of the trade and be accepted as the guiding star in selling campaigns. We sincerely hope that sale activities will not be hampered by the timidity that the acceptance of such an axiom would induce. Yet there appears to be a growing tendency to consider the motor truck and the motor 'bus merely as means of rejuvenating fainting railway earnings, instead of as virile competitors within the fields to which they are best suited.

We have no sympathy with those who utter such idiocy as "the 'bus will oust the street-cars" or "motor transport will break the railways"; nor are we any less impatient with those who are content to let these important and economically invaluable instruments of commerce act as the handmaidens of the railway interests. There is a sharper cleavage between the flexibility of motor transport and the rigidity of fixed rail transportation than railway men are prepared to admit, except insofar as their recent purchases of motor equipment may be construed as a sign of admission, and it is absurd to believe that the field of the truck and 'bus in public service is to be limited to the share of business granted them by the goodness of heart of railway proprietors.

In private industry the motor truck had to force its way as a competitor, not as an auxiliary, in spite of those whose appeals for tender regard for the horse were heard on every side, and the same sequence of events will be witnessed in the field of public service. When the vested interests are loath to embrace the new idea—to voice but the mildest interpretation of the railways' attitude—private capital will and must be found to take the risks of advancing transportation economy and expedition. In no other manner will the motor vehicle be able to take its place as a superior means of transport within its field; certainly not if its destiny is to be delimited by the dictation of railway balance-sheets. It is not for the obsolescent to say where, when or how the newer and better means shall be applied; the latter must find and fight for its proper position. In that sense the two modes of transport are in direct opposition, and we shall hate to see the day when motor proponents are willing to have the issue decided by anything short of a test of relative merit and suitability.

White May Make 9,000 Trucks

The annual meeting of the stockholders of the White Motor Company was held at Cleveland May 6. The stockholders re-elected as directors Windsor T. White, Walter C. White, Thomas H. White, Homer H. Johnson, Otto Miller, Warren S. Hayden, J. R. Nutt, and William G. Mather of Cleveland, Walter C. Teagle and E. R. Tinker of New York City, and Philemon Dickinson of Philadelphia. R. W. Woodruff was elected to fill the vacancy caused by the death of A. R. Warner.

At the meeting of the newly elected Board of Directors, the following officers were relected: Windsor T. White, chairman; Walter C. White, president; Thomas H. White, vice-president; George H. Kelly, treasurer; T. R. Dahl, secretary.

The president, Walter C. White, stated that in the month of April, 987 orders had been received compared with 640 for the same month last year, 50 per cent. increase, and that 855 trucks were delivered during the month, an increase of over 20 per cent. over the corresponding month last year. He further stated that the factory is rapidly increasing its production, 750 men having been employed since April first, making the total number of employees in the factory now over 3,000. If the present rate of sales is maintained, the company should do a business of approximately 9,000 trucks this year, upon which substantial earnings would be made.

The cash position continues to improve. There are only $2,800,000 of notes payable, with no customers' notes discounted, and cash of over $2,500,000 and accounts of notes receivable of approximately $6,000,000. When asked concerning a rumored consolidation with another truck company Mr. White said his only information was the newspaper story and that there was absolutely no foundation for the rumor.

Expenditures totaling $968,697 of National Forest Highway Funds for the construction of 50 miles of roads in California have been approved by Secretary of Agriculture Wallace. This money was made available for roads serving the national forests and for roads within or adjacent to the forests, which are of primary importance to States, counties, and communities.

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Good Trucks, Sold Right, Will Command the Market

WEAK MANUFACTURERS MUST VANISH

"In this day of returning business in the motor truck industry it is of the utmost importance that the manufacturer take a long look into the future and make his plans accordingly," says Martin L. Pulcher, vice-president of the Federal Motor Truck Company. "The motor truck business is going to continue long after the day of many of the companies now in it. How long many of the present companies are to continue is largely a matter of their ability to analyze the fundamental requirements of the business and their capacity to meet them.

"Most important of all considerations is the merchandising policy. Manufacturers without a strong selling organization or the ability to develop one might as well get out of business now and as quietly as possible. The best trucks in the world stored in the rear of any factory will never produce a cent of profit.

"Trucks should be fathered almost in the sense that a child is and this fathering carried through until the truck has completed its mission as a business adjunct. It is not enough for the manufacturer to sell the truck to a distributer or the distributer to a user. Both manufacturer and dealer must be in position to help the owner keep it operating. Manufacturers unable to do this or manufacturers with dealers unable to do this are not operating on a basis sound in its possibilities for the future.

"There is a large amount of truck business now and promise of capacity business soon. For the present, manufacturers are content to trail with this business rather than seek to control it. For this reason demand is running in excess of supply. As the trend of business becomes more definitely established the truck makers will meet the demand with spot deliveries. It is unwise to take chances on creating a surplus.

"Factors making for truck business now are the rapid growth in building operations and the opening of extensive road-building operations. Material prices in these fields are low. The number of idle freight cars is decreasing and some roads are placing orders for new cars. This means motor truck operations on both ends.

"Practically all the surplus war trucks have now been distributed, removing a serious sales resistance factor for the truck manufacturer. Used trucks do not exist in any quantity. War trucks shipped back from abroad in good condition have, for the most part, been sold. There is no market for the others. Steps have been taken to prevent any more coming back.

"Taking all these factors into consideration, there remains only the question of continued restoration of general business. Indications are that it will continue its strides. Later on this year, with fair prices for farm produce, there will be large developments in this field.

"With all these harbingers of business there should be no pessimism for motor truck manufacturers who are solidly established. Good trucks, sold right and properly maintained, will command the market."

First Quarter's Tire Output

Statistics of the rubber industry for the first three months of the year as compared with the same period in 1921 follow:

SOLID TIRES.

1921—	Inventory.	Production.	Shipments.
January ..	303,753	21,220	29,116
February ..	304,374	23,365	29,599
March	283,800	28,710	43,926
1922—			
January ..	182,000	40,000	33,000
February ..	183,000	39,000	37,000
March	182,197	49,433	48,350

CASINGS.

1921—	Inventory.	Production.	Shipments.
January ..	5,319,605	703,430	965,417
February ..	5,193,018	819,892	1,073,756
March	4,597,103	1,163,314	1,614,651
1922—			
January ..	4,174,000	2,055,000	1,597,000
February ..	4,691,000	2,084,000	1,562,000
March	5,183,286	2,645,790	2,073,963

TUBES.

1921—	Inventory.	Production.	Shipments.
January ..	5,586,163	740,824	1,042,617
February ..	5,415,464	916,627	1,129,881
March	5,044,861	1,346,483	1,643,690
1922—			
January ..	5,247,000	2,343,000	1,890,000
February ..	6,142,000	2,597,000	1,703,000
March	6,991,118	3,017,511	2,090,737

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" include only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

Ford's Production Mounting

In four months ended April 30 the American and foreign plants of the Ford Motor Company, excluding Ford of Canada, turned out 281,066 cars and trucks, an increase of 16 per cent. over the first four months of 1921 when the same plants turned out 225,216 vehicles. The actual output for April was 100,232 compared with 69,008 for March, 1922, and less than 90,000 in April, 1921.

April production of 100,232 is the first time in the history of the Ford Motor Company that the American plants' production of cars and trucks exceeded 100,000.

The company says its reports on both motor vehicle and tractor sales indicate that the demand is more than a month in advance of last year's output figures showing that April production of domestic and foreign plants combined is equal to that of May, 1921, the total output of all plants, including Ford of Canada for April, was 111,944. The Canadian plant turned out 5,808 cars and trucks, an increase of 600 over March and the foreign plants produced 5,904 cars and trucks.

From the standpoint of various Ford assembling units the Detroit branch ranked first in April with 11,155 cars and trucks. Kearney was second with 11,125 (a record April), Philadelphia was third, Chicago fourth, and Buffalo fifth.

The River Rouge tractor plant completed 7,445 tractors during April, while the Cork, Ireland, plant produced 121. Total Fordson tractor production for the first four months of 1922 was 15,906 compared with 13,470 for the corresponding four months of 1921.

Trucks and 'Buses Belong in Field of Distribution

RAILMAN DOES NOT EXPECT RIVALRY

Speaking before the Transportation Club recently, Elisha Lee, vice-president of the Pennsylvania Railroad, touched on the relations between rail and motor truck transportation. He said, in part:

"As Mr. Henry Ford has pointed out, the development of heavier cars and locomotives and longer trains on our railroads has undoubtedly detracted somewhat from the flexibility which is so desirable in the handling of short-haul, less-than-carload traffic, but I think Mr. Ford is wrong in assuming that we should reverse the present evolution of railroads and go back to small cars and light engines, as that would rob us of the great efficiency and economy now obtainable in the long hauls of both freight and passengers which make up such a vast proportion of our total ton-mile and passenger-miles of service.

"In time, is it not possible that we may come to look upon the motor car, motor 'bus and the jitney not so much as competitors of the railroads, but rather as helpful auxiliaries to the railroad service? I do not anticipate that they will ever seriously compete with the railroads for the longer hauls, either of passengers or freight. Certainly nothing of the kind is likely to come about unless motor vehicles are developed of a radically different type from those now in use, and the up-keep and maintenance of public highways can be greatly cheapened beyond anything now in sight.

"As I see the matter, motor 'bus and motor truck transportation will ultimately find their proper places in the field of distribution, and will be coördinated with the railroads probably on the line of taking care of the short-haul freight, leaving the field open to the railroads to become sole instruments in the long-distance transportation, both of passengers and freight. That this will ultimately be helpful to the railroads seems to me reasonable.

"It must not be forgotten that a passenger who rides ten miles, or a ton of freight which moves thirty miles, utilizes and needs terminal facilities just as much as the passenger or freight shipment moving a dozen times as far. To put it another way, the more we increase our proportion of long-distance business and decrease the proportion of short-distance, the smaller becomes the terminal investment necessary for each ton-mile and each passenger-mile of service rendered."

Marvin E. Monk has been appointed assistant sales manager in charge of general sales of the U. S. Ball Bearing Manufacturing Company of Chicago. Mr. Monk was formerly special sales engineer for Manning, Maxwell and Moore, Inc., New York City. J. J. Torpey will continue as assistant sales manager in charge of bearing distributers.

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Reeves Defends Work of Good Trade Associations

NO NEW LAWS NEEDED, ENFORCE OLD

Service which is of direct benefit to the public supplies the best proof of the increasing need for properly conducted trade associations, according to Alfred Reeves, president of the Trade Organization Executives of New York, who addressed the convention of the National Association of Manufacturers at the Waldorf-Astoria May 10 on "Relations of Trade Associations to the Public."

Mr. Reeves, who is also general manager of the National Automobile Chamber of Commerce, asked that so-called "open price bureaus" be not put in the class of trade associations, with their score of activities that have no relation to prices or production. Trade association activities of value to the public include research work which makes for more scientific use of products, activities relating to more prompt delivery of goods, better service, more uniform standards of design and material as a basis for comparison; protection against untrue or exaggerated forms of advertising; the elimination of unnecessary styles; the reformation of unfair trade practices that tend to deceive and, of course, the thing which is of very definite value to consumer —lower prices for the things he buys.

"Trade associations have elevated the moral tone upon which all business is conducted," said Mr. Reeves. "While there are many legitimate activities of trade associations of primary benefit to their members, and with the public's benefits incidental or indirect, there are also dozens of association activities that bring direct and concrete benefit to the man on the street, and it is this work that will increase or decrease the standing of all associations."

"Some trade associations and open price bureaus which have to do with the so-called 'open priced compeition' are under fire," said Mr. Reeves, "but they are only a small percentage of the 500 or more trade associations that have become such an important factor in the upbuilding of American trade in this country and also in meeting the competition in our struggle for the world's markets. Trade associations are a natural result of the concentration of effort toward lower prices for better goods, to the ultimate broader purchasing power by the public.

"The trade association of standing does not ask exemption from the terms of the Sherman law, no matter what releases from this law may be given to the farmer or to labor. I find no real business man who does not want to see the fundamentals of the Sherman law continued and its provisions vigorously enforced. Just now there is a disposition on the part of well meaning men to ask for additional laws for trade associations and for business generally. What we need is not more laws but a vigorous enforcement of present laws. The legitimate trade association requires no legislation to make its work more efficient, but we need prompt action by governmental departments to learn which, among a limited number of trade associations, are doing work that Secretary Hoover says places them in the 'twilight zone.'

"The trade association is a voluntary organization to which all of standing in the same line of business are admitted to membership. It is not autocratic. It undoubtedly supplies the greatest benefits to the small manufacturer or dealer. In a vast number of cases, it does not include some of the biggest manufacturers, which disposes of the suggestion that trade associations make for monopoly. Most of them aim to eliminate duplication of work, to simplify manufacture and to make products better; and to reduce the required capital on the part of manufacturers and merchants.

"The trade reports of these associations, are weather vanes of business and tend to eliminate guess work. Price is something which most trade associations studiously avoid discussing, but as associations in such activities are well known, an investigation by the proper Governmental department should prove quickly whether or not they are operating in violation of law."

To Facilitate Export Trade

The continued lead by automotive products in exportation of manufactured goods, fully justifies the interest shown in overseas trade by the large attendance at the recent Foreign Trade Convention in Philadelphia by automobile company officials, including David S. Ludlum, a member of the National Motor Truck Committee, and H. M. Robins, member of the Foreign Trade Committee of the National Automobile Chamber of Commerce. Mr. Ludlum took active part in preparations for the event as Chairman of the Publicity Committee, while Mr. Robins served in the capacity of trade adviser.

In commenting on the convention, Mr. Robins referred to "the excellent effects on the people in all sections of the U. S., who, impressed by the importance given the conventions by high executives in all industries, are gradually being converted to the truth that domestic prosperity is directly linked up with foreign trade.

"The possibilities for Americans to be assured of domestic well-being by maintaining the rank required in foreign trade during the war will be increased through our growing experience and selection of high-grade personnel as well as through standardization of export practices. Recommendations already made for uniform bill of lading, financial and insurance documents are indicative of the American mind and point to the way in which our export trade may be efficiently conducted without unnecessary waste of human energy. This conservation of work is sure ultimately to offset any adverse effect from differences in labor costs and to keep us in the front rank of exporting nations.

"In the world's automobile trade our percentage continues to be considerably larger than that of any one or two competing nations combined. An improvement has also been noted during recent months, with prospects for future exports brightening more and more as the utility features of motor vehicles are being realized abroad."

Business on Upward Trend, Says American Express Man

BAROMETER IN EXPRESS SHIPMENTS

Declaring that the period of business stagnation had passed, that he could see the upward trend, and that the American people had been kept down just as long as it was possible to keep them down, Robert E. M. Cowie, vice-president of the American Railway Express Company addressed a group of electric automobile men at the opening session of the 5-day convention of the National Electric Light Association in Atlantic City on May 15.

"The thing that upsets the American people more than anything else," said Mr. Cowie, "is the condition of business. I feel that the express business is the best barometer in the country. We can, by looking at our reports from all these different sections of the land, put our finger down better than any commercial agency and tell you just where the bright spots are, commercially and industrially. We believe we can see the upward trend. Our feeling is that the period of stagnation has passed away. Our feeling further is that the American people have been kept down just as long as it is possible to keep them down.

"There are many things to be thought out and adjusted before the national and international trade balance is arrived at, but it is on the way. The opportunity for increased business is at hand and it remains to be seen whether the people of this country in all their different lines of endeavor are going to embrace the opportunity when it presents itself.

"The future of the motor vehicle is so great that it is hazardous to predict where it will stop. It is taking the place of transportation by rail to a very great extent, radiating from the great commercial corners for distances of from 100 to 200 miles."

The American Railway Express Company is the largest user of electric trucks in the world. Beginning with one electric in 1908 the number was increased to 51 in 1911. One hundred and twenty-three have been purchased this year. There has not been a year since 1911 in which some electrics were not purchased. The company now operates 1194 electric street trucks and 250 electric industrial trucks making a total fleet of 1,444 electrics, the largest in the world.

The session at which Mr. Cowie's paper was presented was attended by three hundred transportation men from all over the country. Several other papers relating to the opportunitites in the electric field were heard.

Expenditures totaling $575,000 of National Forest Highway Funds for the construction of 50 miles of roads in Washington have been approved by Secretary of Agriculture Wallace. This money was made available for roads serving the national forests and for roads within or adjacent to the forests, which are of primary importance to states, counties, and communities.

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Gasolene at Bargain Prices

How Mobile, Alabama, has solved the gasolene problem is told of in a survey of the Mobile Coöperative Gasolene Company made by Lynn M. Shaw, assistant general manager of the National Automobile Dealers' Association. The Mobile coöperative company was organized to supply high-grade gasolene at minimum prices to motor-vehicle users. The primary purpose was in the interest of owners of fleets of motor trucks. It was capitalized at $10,000, the stock shares of $50 each. Most of it was sold to the fleet owners; the balance was offered to and bought by members of the automobile club.

Two filling stations (curb pump types) were first established. Gasolene was purchased in quantity. All stockholders were expected to buy from the stations. The stations also were to sell to any other persons who desired to buy. The quantity purchase of gasolene made possible the retailing of it at a price a few cents less than that at which it was offered by the larger companies. Two more stations were added and the gasolene is purchased in enormous quantities.

The company owns and uses four large storage tanks. It is buying gasolene at 17 cents and selling it for 21 cents a gallon. This price is two, three and five cents lower than gasolene can be bought for in cities within one hundred miles of Mobile. The price of gasolene at the filling-stations conducted by the large oil companies is the same as that at the coöperative stations and, therefore, several cents less than the prices at which these same companies are selling gasolene elsewhere in Alabama and other states.

The girls who operate the stations must pay out of their pockets for the amount of gasolene unaccounted for, in cash or in the tank. They give courteous attention and service that is noticeably different from the ordinary type of gasolene station service.

Volume is of keen interest to the company. The greater the volume, the greater the profits, as in any other business. And each 60 days it declares a dividend to its stockholders. It has not failed to declare a dividend in the several years of its existence. This dividend sometimes amounts to two or three cents per gallon. It is figured out on a different basis from that, but the stockholders like to talk about a per-gallon dividend, because, to them, this is an additional cut in the price of the gasolene they use.

The capital stock of the company has never been increased. But its value is considerably higher. If it were possible to buy stock in the company to-day—and there is none for sale—it would change hands at $300 per share. That was the last quotation on it, when it was withdrawn from the market in 1919. The original capital is still intact and there is a large surplus and a reserve that is piling up all the time. The plan is quite simple and requires little operating capital.

Assets of the bankrupt Sandow Motor Truck Company, Chicago, have been sold at auction. The property was purchased by various bidders, some of it by the Giant Truck Company, Chicago Heights, Illinois. There are more than 500 Sandow trucks in use in Cook County, Illinois.

Engineers Compare 'Buses, Rail Cars and Steam Train

MOTOR FLEXIBILITY DEMONSTRATED

A direct comparison of the performance of gasolene rail cars, gasolene motor 'buses and a regular railroad train was made for the first time, April 21, 1922, when a party of sixty-five automotive engineers journeyed by all three methods from New York to New Haven and return. The party, consisting of members of the Metropolitan Section of the Society of Automotive Engineers, witnessed this unusual demonstration in attending a joint meeting with the New England Section of the society at the Sheffield Scientific School of Yale University. It was made possible through the coöperation of the New York, New Haven & Hartford Railroad and the International Motor Company.

The trip from the headquarters of the society at 29 West Thirty-ninth street, New York, to the Harlem River Terminal of the New Haven road was made in two Mack 25-passenger motor 'buses, where the rail cars were waiting. The rail cars were two of the three Mack rail cars operated by the New Haven system and took the party from New York to New Haven. The trip from the Harlem River to New Haven, 67.2 miles, was made in 2 hours and 40 minutes at an average speed of 25 miles per hour. Simultaneously with the departure of the rail cars, the two Mack 'buses started for New Haven by road, arriving there just 42 minutes later than the rail cars. The distance by road, as given by the *Automobile Blue Book*, is 70.3 miles, the time of the 'buses being 3 hours and 22 minutes, an average speed of 21 miles per hour. The return to New York was made on one of the fast electric trains of the New Haven road, the return trip being to the Grand Central Terminal at Forty-second Street, 72.3 miles. The train schedule called for 1 hour and 58 minutes for this distance, an average sped of 36½ miles per hour.

A comparison of these performances is interesting, not because the three types of transportation equipment may ever be expected to compete, since each occupies a distinct field, but because it shows the flexibility and adaptability of automotive equipment as applied to passenger transit. The train, of course, was a fast, long-distance express train, consisting of mail, baggage and express cars, coaches, Pullmans and a diner, with accommodations for about 350 passengers. The rail cars were provided with seats for 35 passengers and a compartment for their baggage. The 'buses seated 25 passengers. The electric locomotives are capable of pulling such a train as this as fast as 70 miles per hour. The gasolene rail cars can do 40. The 'buses can be operated safely at 30 miles per hour. The performance of none of the three represents its maximum capabilities, since the train and the rail cars were held down below their maximum speed by their schedules; the 'buses by speed laws on the highways.

The demonstration did show the flexibility of gasolene equipment, both on the highway and on the rails, however—a flexibility which steam and electric railway equipment both lack. On the particular route covered the density of traffic unquestionably makes the regular steam or electric train the most economical and satisfactory to the public, since frequent service can be given with well-filled trains. Branch lines, on which there is less density, can not be economically served by steam or electric trains because of the lack of traffic volume. On many of these lines, even where the mileage is equal to or greater than the New York-New Haven run, there is insufficient traffic to warrant running more than one small train a day, which is generally not satisfactory service to the public. It is for lines of this character that the Mack gasolene rail car has been developed and adopted by the New York, New Haven & Hartford and other railroads throughout the country. With these small, economical carriers frequent service can be provided at a profit to the railroad, where in many cases even the minimum one-a-day franchise-holding steam-train schedule would occasion a loss.

The two cars supplied by the New Haven road were taken from regular branch-line runs especially for this demonstration. One operates between New Haven and Darby, Connecticut, and between New Haven and Hartford, Connecticut, making 164 miles per day. The other makes a daily round trip between Litchfield and Waterbury. A third car makes two round trips daily over the 15-mile branch line between Tremont, Connecticut and Fair Haven, Massachusetts.

In a short talk given by W. L. Bean, mechanical assistant to the president of the New York, New Haven & Hartford Railroad, during the meeting at New Haven, he stated that the railroads were deeply interested in the possibilities of gasolene rail cars in turning operating losses on branch lines into profits, and bespoke the coöperation of automotive engineers in assisting in the greater development of automotive railway equipment. The meeting was devoted to an inspection of an automobile chassis-testing dynamometer in the mechanical engineering laboratory of the Sheffield school and an address on power losses in automotive chassis by Prof. E. H. Lockwood.

Following the meeting most of the membership, having purchased tickets beforehand, returned on the train, but about a dozen rode back to New York on the two 'buses which had made the record-breaking run that morning. Throughout the trip, both going and returning, the engineers in attendance agreed as to the smoothness of riding of the 'buses and rail cars due to the rubber shock-insulators which are an exclusive feature of Mack equipment.

Firestone Wages Raised

The Firestone Tire & Rubber Company announces a wage increase of 10 per cent. in both Akron plants, effective at once. This is the first announcement of a wage increase to be made there in more than two years. The move substantiates earlier reports which indicated that some upward adjustments would have to be made by the rubber industry in view of the demand for labor and the slightly increasing cost of living. Other rubber plants have not made announcements, but it is expected that they will do so shortly.

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Economy in Selling Is Essential

By NORVAL A. HAWKINS
Advisory Staff, General Motors Corporation

WE ARE passing through a strenuous period in the automotive industry. The old methods, that have characterized the whole industry as being flighty, vacillating and extravagant, can no longer survive. The big profits of the future must come out of what has been wasted in the past.

A strict painstaking business-like economy will be the order of the new day. The manufacturer who follows wasteful slipshod methods in the design, manufacture and marketing of his product can no longer survive, and, by the same token, the distributor or dealer who has hovered under the protection of a sellers' market, must either close shop or get in step with new conditions.

I believe that the future of the automotive industry is absolutely secure because it is based on a universal and ever-increasing demand for fast and economical transportation. I believe that success will attend those companies which make an intelligent study of the public's needs and apply the knowledge thus gained in the design, manufacture and distribution of their products. I believe that leadership in the industry will be identified with quantity production, broad-scale scientific merchandising and a perfect coördination of all essential activities. Automobile manufacturers lead all others in the fields of scientific research, invention, engineering, processing and manufacturing. The efficiencies and economies exercised in our modern plants are the standards of the world, but the injection of similar standards and efficiencies into our methods of advertising, selling and servicing is yet to be accomplished.

The purpose men have in going into business is to make a profit, and since there can be no profit from any business transaction until a sale has been completed, all the purposes of business men move toward their ultimate objective—the sale of what they produce. But the fundamental importance of the completed sale is seldom given first consideration when each and every business subject is studied. Broadly speaking, the first thought of a business man about any phase of his operations or any contemplated project should be: "How will this affect sales, and how can I turn this to best advantage in increasing sales?"

It is axiomatic that every employee has a personal interest in the business of his employer. If a business is animated by policies that offer a wide range of opportunities for its personnel, this interest is stimulated to maximum degrees of keenness. Even the day laborer is interested in prosperity that insures the continuance of his job, whether or not he has any hopes of promotion to increased pay. So not only are the heads of a business and the personnel of the "Sales Department" concerned with this big sales objective, but it is also the unrealized purpose for which every individual in the organization is working.

Inasmuch as sales concern everybody in a business, they should in turn, be everybody's concern. Therefore, it should be an aim that each employee shall be made to regard himself as a salesman, and instructed in his function and shown his opportunities as such so that he may be a *good* and not a *bad* salesman. There is not a single employee of a concern who does not exert some influence on the sales possibilities of the business. It is impossible to exaggerate the impetus that would be given to sales if there were coördinated intelligent direction of the thoughts of all employed men and women toward a common objective which would in turn be reflected directly and indirectly in greater sales for each and every organization.

In order to accomplish this result, the whole organization must be permeated with the selling idea. That is, the principles of salesmanship must be used throughout the business, taking the place of arbitrary policy, and using *objective* methods, instead of *subjective* methods, to get things done.

It is generally admitted now that salesmanship is an art, governed by pretty well defined scientific rules. If all these rules were generally known and followed, the sales efficiency of business would be tremendously increased. Therefore, a second fundamental principle of sales policy should be the development of a sales department, under the direction of a competent sales manager, to include everybody in the business and not just those individuals who come into direct contact with customers, as professional salesmen. It should be part of the function of this sales department to permeate the business with the sales spirit, and to open the eyes of all individuals to their sales opportunities.

Beginning with the principle that every individual in the organization is a salesman, the next stage is the development of sales ability in each individual to the highest degree. There is some excuse for shop and office men who do not use sales methods because they do not consider themselves as salesmen. But there is no excuse for the lack of salesmanship so common among ordinary so-called salesmen.

Not so long ago an analyst made a trip along automobile row. His experiences were interesting, and rather humiliating for a sales executive to hear.

(1) The salesman of the first dealer called upon was too busy shifting a machine into place in the showroom to give any more attention than a nod to the supposed prospect. The caller stood around for a few minutes and then walked out.

(2) The salesman who greeted the visitor at the second dealer's showroom was very cordial. It appeared that the vehicle he was selling had been an "oil-pumper" in previous years, and about the first thing this salesman explained was that the new model was no longer an "oil-pumper," and that all its former faults had been taken out.

(3) The third salesman was of a noisy type. He started out by declaring that his machine had the most powerful motor in the world, and that it was a good machine now because the management had been shaken up.

(4) The fourth salesman, at another dealer's, was very proud of the vehicle he represented. This pride quickly developed into "knocks" against competing machines that were casually mentioned by the prospect.

(5) The fifth salesman was a fast worker. He started in immediately to "qualify" his prospect. Finding that the supposed buyer was not thinking of purchasing a machine at once, the salesman lost all interest in him.

Salesmen like these will never bring business back. They should go back where business used to be, in the "jazz days"—when taking orders for motor vehicles was a game—not a business.

How many realize that our selling processes to-day are so inefficient that they amount to more in cost than all the processes of production? Efficiency in motor vehicle manufacture has been raised to a very high degree, and so far outstrips efficiency in distribution that the costs of making versus marketing machines are altogether out of proportion. In order to bring business back, costs must be lowered, so that the markets may be widened. Up to now we have concentrated our efforts on reducing factory costs, and have neglected the greater costs of getting the goods turned into profit through efficient and economical selling. We must stop doing things that do not pay and stop putting up with salesmen who do not pay.

WE should be cutting out now the selling wastes, and chopping off our sales efficiency. The way to eliminate waste is by knowing how to sell, and practicing that knowledge after we acquire it. We should be studying salesmanship in service first and perfecting ourselves in that kind of selling. And right salesmanship involves fundamental principles of business policy and organization, not just selling talk.

What sort of advertisement of service is the place of business, for instance? Is the building adapted especially for representation of the machine sold? Is there an attractive showroom and a fully equipped service shop; a complete stock of parts and up-to-the-minute records to prevent the possibilities of failure in service anywhere? Is there effective publicity work to sell the service functions?

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I have visited the places of business of a great many automobile dealers who were the worst kind of misrepresentatives of the manufacturers of the machines they dealt in. A place of that sort is a disgrace to the name of the vehicle it displays. It is an insult to every man who might come in with the idea of buying anything there. Clean people won't go into a dirty showroom to look at a clean product. They can't believe either, that a vehicle in that sort of place could be clean.

In the showrooms of some of these misrepresentative dealers one can find nearly anything under God's heaven to distract a "prospect" from actually buying. The salesroom is not the place for displaying a lot of extra equipment and repair parts that would scare anybody out of a notion of buying, the minute he gets the suggestion of extras and expenses.

THE ideal motor salesroom hasn't a single thing in it except the proper decorations and necessary furniture and the machines on the floor—plus clean, keen, attentive salesmen of service first who never let a prospect put his fingers on the front doorknob without being right there on the spot to welcome him and help him. A would-be buyer never gets lost in that sort of salesroom. Somebody keeps track of him and serves his needs every minute. Good business sense requires that the parts stockroom should be entirely separate from the salesroom, and he should not be visible from the place where the selling is to be done.

Advertising is a second major essential to our job of bringing business back. Advertising is only a form of selling. It is the advance card of the personal salesman, in most businesses. Sales and advertising are essentially interrelated, but it is astonishing how little real salesmanship there is in the average advertisement, and what a poor advertiser the average salesman is.

It is simply common sense that sales work and advertising should be perfectly coördinated, but they seldom are. Good advertising, properly coördinated with selling, is one of the most important agencies of economical distribution. But average advertising is either grossly or partially wasteful, because it is not intelligently tied up with a sales objective. Far too many advertisements only mirror personal vanities and idiosyncrasies of advertising theorists, who are not salesmen at all in the truest sense. I take off my hat to the advertising man who thinks as a salesman. I always feel like taking my coat off to show my opinion of the so-called advertising man who thinks only as a spender of an advertising appropriation. I might say in this connection that I think the most inappropriate thing for an advertising department to have is an advertising appropriation. I don't believe in signing blank checks. In my opinion an advertising manager or agent should be required to give a plan and a specification, and make an architectural drawing of a plan and its results, before getting money for publicity.

I would hesitate to say how much money is being wasted in advertising at the present time. I know that every advertising man will agree with me that it is tremendous, because I never knew an advertising man who could not show me things that were wrong with the copy of other advertising men.

Every dollar unnecessarily added to costs, every dollar that does not represent full value to the ultimate user or buyer of the product is a detriment to the success of a business. The wastes of inefficient advertising, like the wastes of inefficient personal selling, have piled up enormous burdens that must be carried by efficient production.

The chief fault of nearly all distributing methods of the automotive industry has been exaggerated emphasis of quality in product. There was a time, of course, when improvements constituted real selling factors. But now after the product has been largely standardized in the respective price classes, advertisers and salesmen still continue to claim points of superiority in particular vehicles. The "prospect" knows all the various vehicles can not really be the best, so much-claimed points of superiority have little effect, and making them in advertisements or by word of mouth is a waste of time and money in most instances.

The reason for poor salesmanship and advertising lies in superficial thinking about distribution. Automobile manufacturers have had keen vision in engineering—some of them have seen pretty clearly in actual production—but not many of the existing companies show real foresight in distribution. All the companies make their selling hard work because they don't start from the fundamental comprehension of what should be sold. They have been striving against each other to sell goods; whereas they should have worked primarily to sell the ideas of motor travel, transport and traction.

A suggested new idea is more likely to be effective with a "prospect" than is a stated fact that is unfamiliar to him. The mind meets the statement of a fact with questioning or opposition. Hence the statement in advertising, or in a selling talk, of claimed points of superiority in product does not create the desired impression on the "prospect" that the product is really desirable. But if an old familiar idea is brought to the present consciousness of a "prospect" in such a way that he accepts it as one of his own facts, a suggested inference from that fact will also be accepted as a fact, though that inference is new to the "prospect."

To illustrate with regard to effective advertising of a passenger-car. The "prospect" is not convinced by a claim that a certain car is the most beautiful car in America, that another car is the comfort car, that still another is the thrift car. He doubts the truth of such a claim. The salesman of a fourth manufacturer could convince the prospect that the fourth car was more beautiful than the first, more comfortable than the second, and a more thrifty purchase than the third. Such advertising, at most, sells only familiarity with a name. It does not really attach to the product the claimed attributes of superlative quality.

What the prospect wants is to travel, on business or pleasure, by motor car. He wants to travel in a handsome vehicle, comfortably, and economically—all as a matter of course. His need would not be satisfied in any degree if he were to sit in a motionless car, however beautiful, and however comfortable his seat. It would not suit his desire, to be thrifty by standing still. All his other wants are subordinate to dependable transportation by motor vehicle.

The effective advertisement, therefore, will be of motor travel and transportation as desirable. The "prospect" will accept statements about that as familiar facts, without question. He also will not resist statements to the purport that he wants to ride handsomely, in comfort, and thriftily. Then, if the advertisement contains the picture of a car evidently handsome, and that looks comfortable, and which is priced on an economical basis, the prospect will get by suggestion and will accept as facts, precisely the ideas the distributer wants him to have, but which could not be pounded into his head by any claims of superiority in appearance, comfort, or economy. In short, the advertisement should state nothing about the product but indisputable facts—such as price, wheel-base, equipment, etc.

Next we come to service. Generally speaking, service in the automotive industry has been handled in a careless and inefficient manner. In the majority of cases, it has been looked upon as a necessary evil—a side issue, subordinate to the major activity of building and selling complete units. It has been developed, or rather, it has "grown-up," in a hit-and-miss sort of fashion and has never had a share of recognition and sympathy proportionate to its importance. Most of us have depended too much on the sales of new vehicles to new customers, through new and spectacular advertising schemes, with ever-changing models marketed through a new crop of dealers.

MOTOR vehicles, in the future, are going to be sold from the back door of the shop rather than from the sales floors, across marogany tables. Those of us who expect to survive keen competition in a permanent buyers' market must get our "house-in-order."

As a product attains a wide distribution the prospective purchaser becomes more or less immune to our advertising and sales activity and more and more under the influence of his friends who have had experience with the product in question. Whether the product receives an endorsement or condemnation depends largely upon the service that has been and is being rendered.

Efficient service will eliminate the saturation point—it will remedy the pirate parts evil, and it will do more than anything else toward stimulating the used-car market. Efficient service is the most effective insurance to take out on the future prosperity of the automotive manufacturer.

We must sell service first and motor vehicles second. No matter how perfect the design and workmanship of so intricate a product as a motor vehicle, it can not and will not stand up and give a satisfactory account of itself unless it is kept in a first-class condition through systematic inspection, adjustment and parts replacements. And, by the same token, even a second-rate vehicle can be kept going beyond its normal life, if it is properly serviced.

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When such a mechanical product as an automobile is sold, service is a necessary corollary to sales and advertising. One of the fundamental principles of management, therefore, is that service, sales and advertising are essentially interrelated and must be governed by the same general policy, if perfect coördination is to be effected.

Nothing in business is more essential than making friends. Model service will make more friends for the motor vehicle industry than can be gained in any other one way. Service can not be good unless it is intelligently planned, properly systemaized and everlastingly followed up. The service function must be performed dependably and uniformly everywhere that there is a need for service. And it must be performed economically, so that the customer who is served will feel that he has been fairly treated. In the future motor vehicles and the service that must inevitably follow will have to be sold and sold hard—our most valuable allies are our owners whose continued good-will rests largely in the hands of our service men.

Our salesmen must work in closer coöperation with our service departments. When the owner has trouble he calls on the service man to remedy it, not the salesman. Therefore, the service department should have something to say regarding the claims and promises of the ultra-enthusiastic salesman.

The salesman should not be allowed to let his customer drop immediately after the first sale is consummated. It is not only proper but profitable that he continue his interest in his customer and not pass the entire burden on to the service man. In a retail organization where such a policy is followed, the salesman will be more careful in his sales tactics and disappointed owners will be supplanted with satisfied and permanent customers. The far-sighted salesman will make it a point to call on his customers from time to time; he will help the service man to keep these customers sold and he will be amply rewarded for the time and effort involved.

Service in terms of our industry, divides itself into three classifications:

1. Parts manufacture and distribution.
2. Mechanical repair work.
3. Moral or psychological service.

The service man is essentially a salesman; in fact, he must be a super-salesman. The new vehicle salesman, generally speaking, sells the customer only one time. The service salesman, on the other hand, must keep the man sold by reselling him time and time again throughout the life of the machine.

And the customer is invariably in the best of spirits when he negotiates with the new vehicle salesman, but his transactions with the service salesman are usually under the most exasperating conditions.

When a man drives his vehicle into an elaborate service station, there are usually two things wrong: first, the mechanism, and, second, his frame of mind. It is not enough that the machine shall be properly repaired—that is only half the job—the customer has not been properly served until his frame of mind has been repaired.

I have put service last for the sake of emphasis. But in the big job of bringing business back the ideals of service should come first. Motor vehicle men did not originate the idea of service, but I believe we are entitled to the principal credit for the development of modern business ideals of service. When anybody speaks of a service station, the hearer thinks at once of a place where the needs of a motor user are served. The great automobile business has outgrown all precedents, principally because its service ideals and accomplishments have been unprecedented in business history. We must not forget the obligation of service as an essential, in fact as the principal essential to success in bringing business back.

If the purchase of an automobile itself completed the selling transaction, if we had nothing but motor cars to sell, our industry would be dead instead of dynamic. Service is the galvanic life current that vitalizes the automobile business. Service must pulse through all the arteries of our industry, must penetrate into every capillary. If for any cause service to owners should be completely stopped their machines would die so fast that in a month the sight of a live vehicle on the street would be a curiosity.

Every dealer should be a dealer in service first. In fact, the value of any of us in work is only service value. Even one's value to one's self is measured by the amount of service purpose he transforms into actual service practice. We have learned a new law in business, that we call "Give and Get." It particularly applies to the automobile business where unless one gives service one can not get success.

Service is success insurance. The dealer who quits or lets down in his selling service forfeits the insurance on his future prosperity. Insurance premiums must be paid in advance. So the cost of establishing and giving service must first be met before the rewards of service will be paid.

Delivering Ice Cream at 12 Cents a Gallon

By P. H. BAKER
Baker Ice Cream Company, Cleveland

ICE CREAM is no longer considered a luxury to be bought only in summer time, but is much used as a food and a dessert the year 'round. Our trucks make daily deliveries to drug stores, confectionery stores, and restaurants throughout Cleveland. Especially in the summer time, careful organization and dependable trucks are necessary to insure prompt delivery, for many of our customers calculate almost to the hour when buying ice cream. Our Selden truck has worked every day including Sundays for 50 consecutive weeks. We require very hard service of a truck, and it has made a most satisfactory record in our work.

In the hot weather, when the peak load hits us, our motor trucks can work long hours and in intense heat, where a horse would be unable to stand the strain. We have also increased our business range through the use of motor trucks, but it is difficult for us to say exactly what this increase amounts to, because our business has also grown from other causes.

Every one knows that ice cream easily deteriorates in hot weather, so that it is necessary to cover the ground between customers as quickly as possible. Through the ability of our trucks to do this, there is not much shrinkage in the cream, nor is so much of the ice that is used for packing melted in transit. The saving on both these items is considerable, though not easily expressed in figures.

Each of our trucks covers certain territory the year around. The driver is also our salesman. He is guaranteed $35 a week, plus a commission on his sales above a certain amount. During the summer of 1920 the truck averaged 1,000 gallons a week, and the driver made about $60 a week. However, over a 12-month period this route averages approximately 38,000 gallons of ice cream.

Being on a commission basis, the drivers work the trucks hard, because their earnings depend upon the ground they are able to cover and the number of customers they can see each day. Service to the customer means a great deal in the ice cream business, and a driver can see many more customers a day by using a motor truck than a horse-drawn vehicle.

Besides carrying its load of cream, and the ice to keep it cool, the truck carries additional salt and ice to pack the cream at the customer's store. As it is picking up empties at every stop, it usually has a load of about 3 tons over the entire route.

The truck is equipped with a specially built body lined with sheet metal, and other precautions are taken to protect it from salt water. All our trucks are washed every day, and overhauled and painted every year. But the atmosphere about them is always heavy with a salty mist that will attack any part exposed, so our estimated repair bill of $500 a year is not high for the gruelling usage we give a truck.

In the 11½ months ending in April 18, 1921, our 3½-ton Selden truck ran 353 days, and traveled 10,463 miles, making just under 30 miles a day. It cost us $13.14 per day to operate, including $5 a day for driver. In other words, we consider the guaranteed $35 a week as driver's wages and anything over that as salesman's commission.

During the summer months, when we are averaging 1,000 gallons of ice cream per week, it costs us 9.02 cents per gallon to deliver and pack. However, taking the average for the last 11½ months, it costs us 12 cents per gallon to deliver and pack.

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Motors Show Superiority in Refuse Collection

By J. R. COMPTON

SOME very interesting expressions of opinion as to the economy of motor transport for the collection of house refuse are contained in a report prepared by R. A. MacBriar, the city engineer and surveyor of Lincoln, England. Mr. MacBriar recently addressed fourteen questions to 29 different cities and towns in the country, in all of which motor vehicles are used for the work of refuse collection. The questions, so far as they relate to this phase of the subject, follow:

(1) What percentage of cost do you think you save over horse delivery?

(2) Can you tell, generally, how many horses and wagons you have abolished for each truck?

(3) What capacity are your vehicles?

(4) Are you thoroughly convinced that motor transport is a success?

(5) If your town is not entirely served by motor trucks, do you intend to extend the system?

(6) Have you any costs per ton to give me for horses and motors?

(7) What is the average load per day handled by the vehicles?

(8) Can you tell me roughly the average mileage of each vehicle?

The pith of the replies is summarized in the accompanying table, under headings corresponding to the respective questions. As is stated in the footnote to the table, one or two of the figures would appear to be incorrect. As, however, we are not in full possession of the method in which they were obtained, it is probable that they are correct, but have been obtained in some special manner, except in the case of the figures for the daily load and vehicle tonnage of Pontypridd, which appears to have been confused—this, at least, is the only explanation we can offer for a 1,600-pound vehicle which only shifts 2¼ tons per day.

Some interesting conclusions may be drawn from these figures. First, it is instructive to note that the only case where motor service has not compared well is in Glasgow, where the horse service has been carried out at the extraordinarily low figure of 86 cents per ton. In one or two cases the saving has been given in cents per ton; excluding these, but including the Glasgow loss, we find that on the fifteen towns for which definite figures are given, the average saving by the use of motor vehicles is no less than 15.7 per cent. Again, taking the replacement of horse wagons by motor, we find that on twenty-six towns the average shows that one motor replaces 2.7 wagons and teams.

The opinions of the highly experienced cleansing superintendents of these towns are interesting. On the main leading question, whether they were convinced of the superiority of motor vehicles, 63 per cent. gave an unqualified affirmative, 33 per cent. gave a qualified reply, but expressed approval, and only one, making 4 per cent., preferred the horse. Again, taking the question of an extended motor service, in no less than 22 per cent. of the cases the service is already complete. Of the remainder, 81 per cent. intend to complete the change-over, one is doubtful, and 14 per cent. prefer the *status quo*—though this may, of course, merely mean that in their cases also the service is complete.

Leaving the averages and looking at the individual figures, one can not but be struck by the great variation in cost—from $1.14 to $3.12 per ton—between various towns. The other figures show similar wide variations, and it would be interesting to make a detailed examination of them.

Local Authority.	1. Per Cent Saved by Use of Motors.	2. Wagons Replaced by Each Motor.	3. Capacity (in tons). of Each Motor	4. Are You Convinced Motors Are Superior?	5. Are You Extending Use of Motors?	6. Actual Costs per Ton. Horse.	Motor.	7. Tons per Day.	8. Miles per Day.
Barnsley	10*	2	..	Yes	Yes	$1.30	$1.17	..	..
Barrow	14.6*	2½	3 and 3½	A[1]	Yes	1.32	1.17	10	15
Bath	13†	2¼	2	Yes	Yes	2.68	1.88	7¾	10 to 18
Birmingham	..	2	2½ and 3½	A	Yes[2]	Varies		8½	12 to 15
Blackpool	72c per ton.	3	..	Yes	Yes	....	....	..	.....
Bournemouth	..	..	1 to 4	A	No	....	....	..	.....
Canterbury	25	3	2½	Yes	Yes	....	....	8¼	16 to 18
Derby	27	3	2¼	Yes	Complete	....	2.48	7	15
Dover	..	2½	2	Within limits.	Complete	....	2.48	7	15
Glasgow	..‡	1½	2	No	No	.86	1.15	9¾	16
Grimsby	12.4	2½	2	A	Yes	3.55	3.11	8	12 to 15
Hammersmith	96c per ton.	2¼	3½	A	....	....	....	5	15
Ipswich	..	4½	2 and 3½	Yes	Yes	....	....	9½	11 to 12
Islington	36-57c per ton.	2½	2½ and 3	Yes	Yes	....	....	7½	7 to 12
Long Eaton	..	3	2	Yes	Yes	....	....	9	16
City of London	..	2½	4¼	A	No	....	....	5½	15
Marylebone	..	3	2 to 4	Yes	Complete	....	....	7½	20
Newark	30	..	1½	A	Complete	....	1.82	..	.....
Nottingham	11	2¼	2 to 3	Yes	Yes	2.16	1.92	6½	10 to 11
Pontypridd	..	2½	16 to 20*	Yes	Yes	....	1.41	2¼*	25
Rochdale	..	..	1¼	A	....	....	....	5	.....
St. Pancras	10	3	3½	..[3]	Yes	....	....	8¼	14 to 15
Sheffield	7.5	2¾	2½ and 3½	Yes	Yes	2.52	2.34	8½	10 to 20
South Shields	40	6	..	Yes	Yes	2.05	1.24	..	12.3
Taunton	27	2½	2	Yes	Complete	....	....	9	13
Wallasey	..	2½	2	Yes	Uncertain	3.28	3.24	7½	25½
Westminster	33	4	2½ and 3	Yes	Yes	2.08	1.39	8	30 to 35
Willesden	..	..	3½	..[4]	Complete	4.80	....	6	12.3
Wolverhampton	5 to 7½	2½	7 cu. yds.	Yes	Yes	3.24	3.06	8	12

*These figures appear on the surface to be incorrect, but are printed as received. †On total capital. ‡Actually shows a 30% loss. ||Includes other work. §Includes cost of barging. A[1] means: "Yes, for longer distances, say, over one mile." [2]Exact reply: "Yes, but always some work for horses." [3]Only been in use twelve months. [4]In certain circumstances.

Sees Big Farm Market

During 1921 motor trucks covered 7,150,000,000 miles, carrying 1,430,000,000 tons of freight, and it is expected that an increased use during this year will take the figures considerably beyond this record, it is pointed out by F. W. Fenn, secretary of the National Motor Truck Committee of the National Automobile Chamber of Commerce. Mr. Fenn's figures are taken from the report of the senate committee on reconstruction and production, and therefore represent probably as close an approximation of the facts as it is possible to obtain.

Increasing use of motor trucks is marked in every haulage field. Mr. Fenn has found that the oil industries and the lumber people are planning more extensive use of automotive equipment, the lumber interests being particularly interested in tractors. The farmer probably will continue to be the biggest single user of trucks. All these factors already are being felt by the truck makers and dealers.

"With the marked increase in the number of good roads within the present year," Mr. Fenn says, "there will come about a more extensive utilization of motor trucks by the farmer. He will undoubtedly take advantage of this new road development by purchasing extensive truck equipment, as it is a well-known fact that the farmer loses approximately $300,000,000 annually in marketing his crops on account of bad roads.

"It is not surprising, therefore, to find in summarizing the results of a national survey on the extensiveness of the utilization of the motor truck on the farm completed recently by the National Motor Truck Committee that 651 counties in this country are in need within the present year of more trucks. To this end the farmer will be assisted materially by the War Finance Corporation, which has been given a billion-dollar revolving fund by Congress to make possible advances to banks, bankers and trust companies. This will incidentally give stability to the credit situation arising out of the rotation of crops.

"The steady 'powerization' of the American farm is inevitable."

No English Truck Show

The Society of Motor Manufacturers of England, Commercial Vehicle Section, has definitely decided not to hold a truck show this year. Opportunity, however, will be afforded truck makers to exhibit models suitable for special purposes; for instance, at the Royal Agricultural Show—a national event—and at the Municipal Exhibition. But no chassis may be shown at such places, only complete vehicles.

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Compulsory Cab Insurance

Taxicab insurance in New York State is expected to be in a chaotic state after July 1, when a state law providing that every taxicab must be either insured or bonded for a minimum of $2,500 as protection to the public, goes into effect. The taxicab experience of the insurance companies in the big cities of New York has been exceedingly bad, as has that of the general public experience in those cases where injuries were caused by uninsured cabs owned by men whose only assets were their vehicles. This condition was primarily responsible for the enactment of the law, behind which some insurance interests also stood, in the belief that they were creating new business.

However, due to the large losses on taxicab policies, the rates on this class of business are so high as to be prohibitive for the small operator. In some cases full insurance on a taxicab costs more than the machine itself. Quotations gathered recently show that on a taxicab costing $1,145 the rates are as follows: Fire and theft, $78.40; liability, $480; personal damage, $120, and full collision, $592. This totals $1,270.40. If the taxicab has no theft lock, $25 is added, making a grand total of $1,295.40 to insure a vehicle costing $1,145.

The bond is cheaper, but it, too, will be a heavy burden as losses rise. That they will do so seems inevitable, as damage—case lawyers—"ambulance chasers" — are bound to pursue taxicabs with eagle eyes when it becomes certain that if a judgment is secured at least $2,500 will be collected.

Among the taxicab operators themselves there are signs of the formation of a mutual company, and also indications that, if the burden of the compulsory insurance becomes too great, there will be a demand that state taxicab insurance be provided.

About the only people who seem enthusiastic over the coming crisis in taxicab insurance in New York, are a number of clever bondsmen on the east side of New York City, who are getting ready for what they think will be a profitable bonding business.

Value of Motor Service

Service valued at over $17,000,000 a year is rendered by automobiles passing into and out of Connecticut where the state boundary lines are crossed by the New York-Boston turnpike, according to estimates issued by the state highway department. It would cost over $5,000,000 a year to transport over railroads the freight which annually passes through these gateways of the state on motor trucks. The figures were determined by traffic censuses made at Thompsonville and Greenwich.

In the census at Thompsonville the daily average of passenger-car movement for 24 hours was 2,907, or two a minute. Figuring the value of passenger service rendered at the railroad rate of 3.6 cents a mile, service on the Hartford-Springfield road during the two weeks covered by the census was valued at $327,595. At Greenwich the value for the two-week interval was $355,417. On the two roads together, the value of the service rendered for a year would be $17,238,326.

Identical Trucks on Like Work Show Different Costs

By W. L. BEAMER

President and General Manager, Silver Springs Water Company, Detroit

MANY companies feel that they cannot use motor trucks for house-to-house delivery, but we can't help feeling that the motor truck is the best medium for delivering our water to consumers; besides, it has a distinct advertising value over the old horse and wagon.

In May, 1920, we bought two 2-ton Garfords for city delivery work. In order to know exactly how these trucks were performing we began keeping their records on the national standard truck cost system. Later we made a study of the operating conditions of the two trucks, taking the record of Truck No. 26 for a period of 18 operating days against Truck No. 28 for a period of 21 operating days.

A study of Truck No. 26 showed that, during the 18 days operated, it made 29 trips and traveled 541 miles. It made 667 delivery or pick-up stops, and handled a total of 4737 "packages" in and out. A "package" may consist of either a 5-gallon bottle of water, or of a case of bottles containing 6½ gallons of water. The time available but not used was 46 hours and 16 minutes; the loading time, 9 hours and 39 minutes; the running time, including stops, 127 hours and 46 minutes; and the truck was laid up 4 hours and 5 minutes for tire changes. One hundred and twenty-seven hours and 30 minutes of helper's time were charged against this truck.

An analysis of these figures shows that this truck makes 1.6 trips per day, and averages 37 stops. The total units per day handled in and out are 263. The average units on the truck per trip are 163. It takes 20 minutes to load on the average. The average running time per day, including stops, is 7 hours and 6 minutes. This truck has a daily average of 30 miles, which would be impossible for a team of horses to make.

In 21 days Truck No. 28 made 26 trips, averaging 863 delivery or pick-up stops, and handling 2,659 "packages." It went 707 miles, averaging 336 miles per day, which is a little higher than No. 26. This truck has charged against it 20 hours and 30 minutes available but not used. Ten hours and 30 minutes were used in loading. The actual running time, including stops, was 174 hours. Only 23 hours and 45 minutes of helper's time are charged against this truck.

Truck Number 28.

Operation.

Days operated	21
Miles traveled	707
Miles per day	33.67
Miles per gallon of gasolene	4.3
Miles per gallon of oil	707

Average Cost

Cost per day (including driver and helper)	$ 18.63
Cost per mile	.5532
Total cost for period (21 days)	391.12

Itemized Cost.

Driver and helper cost per day (included above)	$ 7.34
Depreciation per mile	.0893
Maintenance and repair, estimated, per mile	.0297
Tire cost, estimated, per mile	.0941

An analysis of these figures shows that No. 28 makes 1.24 round trips each day with a total of 41 delivery or pick-up stops. The average units hauled each day are 127; the average per trip, 102. The average round-trip distance is 27.2 miles, as against 18.7 miles for No. 26. The average loading time per trip is 24 minutes and the average running time per day, including stops is 8 hours and 17 minutes.

Here are two trucks that are identical, running under slightly different conditions, and handling a varying amount of material. Truck No. 26 delivers for 7.86 cents per package, compared to the delivery cost of 14.71 cents per package with No. 28. The cost per package-mile on Truck No. 26 is .84 cents, while on No. 28 it is 1.08 cents. These costs show that the route covered, the number of stops made, and the number of packages delivered per stop, play a large part in the delivery cost of an article.

It must be remembered that these costs were kept with the utmost care. There were no repairs on either truck, except some tire repairs on No. 26; but we figure that $1.00 per working day is sufficient for maintenance and repairs. Although both trucks are making low mileage over well-paved city streets, we are depreciating them on a basis of 35,000 miles life, because we want to write them off our books in three years.

Since neither truck has given us any trouble, we must explain by the difference in routes the fact that No. 26 handles nearly twice as many packages per day over almost the same mileage, and also gets considerably more miles to the gallon of gasolene.

Truck Number 26.

Operation.

Days operated	18
Miles traveled	541
Miles per gallon gasolene	6.1
Miles per gallon of oil	618

Average Cost.

Cost per day (including driver and helper)	$ 20.67
Cost per mile	.6878
Total cost for period (18 days)	372.12

Itemized Cost.

Driver and helper cost per day (including above)	$ 10.92
Depreciation per mile	.0893
Maintenance and repair, estimated per mile	.0333
Tire cost, estimated, per mile	.0941

Federal-Aid Roads

Federal-aid roads completed since 1916 totaled 11,017 miles on March 31, an increase of 8,016 miles during the preceding 12 months, says the Bureau of Public Roads, United States Department of Agriculture. A great many different types and widths were constructed, the general average cost per mile for the United States being $17,120.

In total mileage completed the leading States were Minnesota 1,093 miles, Texas 919, Wisconsin 657, Illinois 489, Ohio 465, and Arkansas 401.

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Short-Line Rail Officials Inspect New Rail Motors

33-MILE-AN-HOUR SPEED MAINTAINED

Railroad officials, having become much interested of late in the gasolene-propelled railway car, were given the opportunity recently of inspecting a later and improved car of this type, when a White rail coach was run over the Pennsylvania Railroad from Philadelphia to Washington, a distance of 136 miles. The car made the run to Washington for the annual meeting of the American Short-Line Railroad Association and was the feature exhibit at the convention. It made daily runs during the convention over the tracks of the Washington & Old Dominion Railway, carrying as passengers the representatives of the various short-line railroads in attendance at the meeting.

While a number of short-line railroads have been operating gasolene rail cars successfully for several years, it is only recently that the gasolene car has come to attract wide attention on the part of railroad men, not only operators of short-line railways, but officials of some of the country's largest transportation systems. Developments in the rail coach are being watched with the keenest interest by railroads, and the run from Philadelphia to Washington attracted numerous prominent Pennsylvania railway officials as passengers. Among the Pennsylvania executives who made the trip were J. E. Burrell, superintendent passenger transportation, eastern region; F. K. Fildes, foreman mechanical engineers office, eastern region; J. M. Jones, passenger trainmaster, Philadelphia terminal division; H. K. LeSure, chief electrician, eastern region; H. H. Haupt, assistant engineer motive power, eastern region; J. Stair, Jr., general electrician, New Jersey division; E. S. Stewart, advertising agent Pennsylvania system; James Buckelew, superintendent Maryland division; Timothy O'Toole, office general superintendent, Southern division; Harry Babcock, passenger trainmaster Maryland division; Edward E. Hess, trainmaster Baltimore division and C. E. Wann, assistant trainmaster Baltimore division. Other railway officials on the car were Senator George L. Shinn, president the Union Transportation Company of New Egypt, New Jersey; Fred Johnson, superintendent the Union Transportation Company; and W. W. Wilson, general manager the Lewisburg, Milton & Watsontown Passenger Railway Company, of Milton, Pennsylvania. Representatives of the White Company, Cleveland, and the J. G. Brill Company, Philadelphia, made up the remainder of the passenger list.

The rail car driven to Washington was built for the Union Transportation Company and is now operating over the company's 25 miles of track, between Pemberton and Hightstown, New Jersey. The company placed a 29-passenger rail car in service several months ago and its operation proved so successful that a second car of larger capacity was purchased.

The larger car—the one used on the demonstration run—has a seating capacity of 41 and a baggage compartment directly in the rear of the driver, who controls the car from the right-hand side. The body which is of semi-steel construction is mounted on a specially designed White rail car chassis. There is a 4-wheel pivotal truck in front and two wheels in the rear. It is governed to a speed of 33 miles per hour. This speed was maintained with ease on the run to Washington. The satisfactory performance of the car both on the runs over the Pennsylvania and over the Washington & Old Dominion Railway from Washington to Great Falls, Virginia, much impressed the railroad men, who were given the opportunity of viewing its operation at close range.

The trips over the Great Falls division of the Washington & Old Dominion Railway were considered a severe test for the car as the road is a succession of grades and curves, the grades running as high as 3½ to 4 per cent. and the curves to 10 degrees, with a frequent combination of both grade and curve. The grades were climbed with ease and a fair speed was maintained even on the most severe ascents. To demonstrate its reserve power the car on numerous occasions was brought to a stop when midway up a grade and again started. It accelerated readily and continued to the top of the grades without difficulty. This was true in both forward and reverse speeds. Refinements embodied in the latest type of rail car make riding exceedingly comfortable. It has been the experience of the Union Transportation Company that passengers prefer riding in the gasolene rail car to the steam trains.

Railroad men are pretty well agreed that the expensive part of the railroad business is the running of thousands of miles of unprofitable passenger service on light branches of light portions of main lines where the people demand service. Once established, it is a difficult thing for the railroads to curtail such service even though it be unprofitable. With recent improvements in the rail car before them, railway executives are alive to the situation and are now genuinely interested in the possibilities of the rail car as a solution to the problem of being forced to operate passenger trains where business does not justify doing so. They are convinced that the rail car, because of its light weight and low first cost, coupled with simplicity in operation and maintenance, is worthy of serious consideration.

How a Showman Travels

One of the most elaborately equipped motor trucks in operation to-day is that used as living quarters by T. Murphy, traveling showman of London, England. The chassis is an FWD. Mounted on this chassis is a van body of special construction, which is divided into two rooms that are completely furnished, one as a bedroom and the other for a living room. The latter contains a piano and there is a small cookstove among other furnishings. In the construction of the body much solid mahogany is used and the interior is elegantly finished. The cost of the body alone was over $9,000.

Lesson of Heavy Tax Levy Now Being Learned Abroad

FRENCH AND JAPANESE OVERBURDENED

High and discriminatory taxes on motor vehicles are proving to be injurious to motor transportation of certain foreign countries.

In Japan this is strikingly illustrated. The authorities of Tokio, apparently seeking revenue, raised the motor tax by 50 to 80 per cent. The operating costs became excessive and many cars were retired from service. At the time there were 5,000 cars in circulation. Upon promulgation of the law 600 licenses were returned and a like number of machines placed in storage. A major problem of Japan, that of congestion in cities, was made more difficult of solution, because of the decrease in modern transportation.

The central Japanese Government, realizing this error, recently sent an official to the United States to study our traffic arrangements. His conclusion was that Japan can solve its problem of congested cities best by encouraging motor vehicle transportation. The removal of discriminatorily high taxes is the first step and action in that direction may soon be officially recommended to the prefectures throughout Japan.

In France the demoralization of the automobile industry is directly traceable to high taxes. Although French manufacturers have an unusual advantage in their home market because of an import duty of 45 per cent. they are still unable to keep their factories reasonably busy. The numerous and high taxes made operation of any type of motor vehicle exceedingly expensive and many persons, whose occupation might make use of an automobile prerequisite, have to forego its time-saving advantages and perform their work in a less efficient manner.

The automobile situation in England is similar to that of France. Motor vehicles, despite their utility value which was especially emphasized during strikes, are taxed. The inequity of this assessment is being demonstrated by experiences of automobile owners who are urging a modification or a repeal.

A contrast from that of these three countries is afforded in the taxation policy of Canada where the taxes derived by the provinces are devoted to the maintenance of roads and where the central government imposes no discriminatory taxes. Canada's motor vehicle registration, 463,000, is nearly as large as the mother country which has 497,000, although the dominion is much smaller than Great Britain in wealth and population.

The Rubber Association of America has leased the Broadway frontage on the 10th story of the Fisk building at 57th street, New York. The space measures 2,000 feet, including a large conference room where the association directors will meet. The Rubber Association has been located in recent years at 52 Vanderbilt Avenue.

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Nature of Intercity Motor Traffic

By JOHN GORDON DOOLITTLE

DURING August and October 1921 the Connecticut State Highway Department, in coöperation with the Bureau of Public Roads, conducted traffic censuses on two of the principal highways of Connecticut. The purposes of the censuses were to determine the economic value of the highway, the classification of vehicular traffic, the gross weight and wheel-loads of motor trucks and the extent of overloading, a basis for the distribution of construction and maintenance costs, density of traffic, width of vehicles and the relation of density and width of vehicles to roadway width, the movement of freight by highway, and speed of vehicles to serve as a basis for a formulation of traffic regulations.

The first census was taken during the last two weeks of August on the Hartford-Springfield road at the Massachusetts-Connecticut state line. The second census took place during October on the Boston Post Road at the town of Greenwich, Connecticut. Each of the censuses covered a period of 14 days. The daily survey covered 10 hours, rotated so as to determine the traffic movement at the earlier and later periods of the day. Two night counts were conducted to form the basis for an estimate of night traffic. Road scales were installed on both roads to weigh the traffic as it passed over the road. At the Greenwich station a 49,000-pound automatic Fairbanks scale was used in order to delay the traffic as little as possible.

During the first census traffic bound south from Springfield, Massachusetts to Hartford, Connecticutt, was weighed whether empty or loaded. North-bound trucks were stopped, but only commodity information was obtained. The density of traffic was such that it was impossible to weigh trucks going in both directions. In the second census the eastbound traffic from New York was weighed, and westbound trucks were stopped only for commodity information. The personnel of the survey included eight men to handle both truck and passenger-car traffic. During the second census older men were employed and the results, especially the truck information, were more accurately recorded. Traffic was only slightly delayed by the observers and drivers coöperated willingly when they understood the purpose for which the information was asked.

During the first census the information desired, including the weight of the truck, was obtained in an average of 1 minute 41 seconds, the longest time being 2 minutes 55 seconds, and the shortest 1 minute. At different times during the census speed tests were made and one of the results of the survey is the indication that a more accurate index of truck speed can be obtained at a place a few miles from the traffic station where drivers will not suspect that the test is being made.

The cost of the first census was $1,693, of which $977 was for the scale, $170 for the cost of erecting it, and the balance for the salaries of the observers. The cost of the second census was $3,331, of which $2,700 was for the scale and the balance for salaries of observers, etc.

No less than 28,011 passenger-cars were recorded during the first census, and for 14,036 of the cars observed the records were analyzed to determine the average haul, number of passengers, etc. In the second census 38,566 passenger-cars were recorded and the records of 5,023 were analyzed. The number of motorcycles and horse-drawn vehicles was so small in comparison with passenger-car and truck traffic that their numbers are not reported. All makes of cars and all types including touring cars, roadsters, and other special types were observed during the census.

Fully 44,950 passengers were transported in the observed cars, southbound in the first census. An average of 3.2 passengers per car. During the first census of the licenses observed 50.5 per cent. of the total were Massachusetts tags, 34.9 per cent. were Connecticut, 7.2 per cent. were New York, and 7.2 per cent. were miscellaneous. The location of the census station near the Massachusetts-Connecticut State line and the fact that this analysis relates to southbound traffic accounts for the high percentage of Massachusetts cars.

In the second census the average number of passengers per car was found to be 3.314. The analysis of license tags shows Connecticut with 53.1 per cent., New York 37.4 per cent., Massachusetts 3.2 per cent., New Jersey 3.2 per cent. A daily average of 6,739 passenger-cars was found for the two censuses, while the daily truck average was 792.

The principal movement occurred between 7 o'clock in the morning and 8 in the evening, the peak load occurring at 5 p. m. The hourly density of truck movement from 8 p. m. to 5 a. m. indicates the night movement of regular truck lines. During this interval an average of 13 trucks passed over the roads per hour.

In the first census the daily average of passenger-car movement for 24 hours was 2,907. The average mileage per car was 70,018 at 3.2 passengers per car, and, figuring the value of the passenger service rendered at the railroad rate of 3.6 cents per mile, the passenger service on the Hartford-Springfield road during the two weeks was valued at $327,595. During the second census the daily average of passenger-car movement for 24 hours was 3,832.4. The average mileage was 52.4. Computing the value of the service as above, the value for the two-week interval was $355,417. On the two roads together the value of the service rendered for a year would be $17,238,326. This figure is merely the value of the service at railroad rates. It is not the cost of the service rendered by these two roads estimating the value at railroad rates. It is not the cost of the service rendered by the roads.

The truck weight data from both censuses was analyzed to determine the wheel- and axle-loads and to ascertain what percentage of the vehicles weighed in excess of the legal limitation of 25,000 pound, and what part of the traffic consisted of vehicles with wheel-loads greater than 800 pound per inch of tire width, and what proportion of the vehicles were overloaded when gaged by the capacity rating of the manufacturers. The latter practice is referred to as overloading per capacity. The weight standard used in determining overloads for each make and capacity consists of a summation of the manufacturers' 1920 weights for the chassis, body, and rated capacity, giving the total weight when loaded to rated capacity. The percentage distribution of weight recommended by the manufacturers of trucks for front and rear axle-load was used as a standard for computing overloads on the front and rear axle. To be conservative 5 per cent. of the total chassis, body and capacity weight was added to the manufacturers' given weight in deriving the standard for computing overloads. One-half of this 5 per cent. was added to the front and rear axle weights in arriving at a standard for measuring overloads per axle.

THE practice of overloading per capacity is not confined to loads of heavy material such as sand, gravel, brick, etc. It is restricted to no typical group of commodities, but is almost universal. Apples, beer, butter and eggs, drugs, fish, furniture, groceries, lumber, meat products, paper, rubber goods, sugar, vegetables and wire are typical commodities of which overloads per capacity were noted. Of the cases of overloading per capacity observed, 75 per cent. was practiced by regular trucking vehicles, 25 per cent. by irregular trucks.

Commodity loads exceeding 25,000 pound were noted in the case of such commodities as brick, butter, drugs, eggs, glass, groceries, litharge, meat, plumbing supplies, sugar, vegetables and vinegar. Of the number of loads exceeding 25,000 pounds 87.8 per cent. were overloads per capacity, 88.7 per cent. were by regular trucking companies. Thirty-nine out of 41 cases were loaded from 846 to 1,560 pounds per inch of tire width on the rear axle.

Only 4.2 per cent. of the trucks observed were over 5-ton capacity. The percentages of other capacities noted were as follows:

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Capacity. (Tons.)	Percentage of Total Number	Capacity (Tons.)	Percentage of Total Number.
¼	9.0	4	1.1
½	8.0	4½	0.6
¾	11.0	5	12.7
1	12.2	5½	2.0
1¼	0.9	6	0.5
1½	6.0	6½	0.4
2	16.0	7	0.2
2½	10.4	7½	1.1
3	2.4	8	0.06
3½	10.0		

The least width of truck body observed in the two censuses was 5 feet, the greatest width in either census was 9 feet 6 inches. Only 6 per cent. of all the trucks observed in the first census and 5 per cent. in the second census were equipped with bodies exceeding 7 feet 6 inches in width.

Pneumatic tires were observed in use principally on the lighter trucks, solid tires on the heavier trucks, and a combination of pneumatic and solid on the rear and front wheels respectively principally in the weight classification from 3,000 to 14,000 pounds gross weight in pounds. The use of pneumatic tires increases rapidly from 2,000 to 5,000 pounds, and then decreases rapidly to 10,000 pounds. The number in excess of 10,000 pounds is negligible. The greatest percentage of trucks equipped with pneumatics occurs in the 4,000- to 5,000-pound class. Solid tires begin to increase rapidly at 5,000 pounds.

The density of movement was found to be between the 4,000 and 14,000 pound classes, 1,378 out of 2,183 observed trucks falling in these classes. Only 51 out of 2,183, or 2.3 per cent. exceeded 25,000 pounds. Only 7 out of 2,183 weighed more than 28,000 pounds.

In the first census 29 of 226 trucks, 12.8 per cent. were found to have front axle-loads in excess of 800 pounds per inch of tire width; 138 out of 359, 38.44 per cent. were found to have rear axle-loads in excess of 800 pounds per inch of tire; 167 of 585, or 28.55 per cent. were loaded to more than 800 pounds per inch of tire width on both axles.

Overloads on the front axle range from 800 to 1,100 pounds per inch, density occurring at 900 pounds. Overloads on the rear axle range from 800 to 1,650 pounds per inch, density occurring at 1,100 pounds.

In the second census the percentage and range of overloads were as follows:

Front axle 11.9 per cent., 800-1,500 pounds, density 950 pounds.

Rear axle 36.5 per cent., 800-1,925 pounds, density 1100 pounds.

Both axles 24.6 per cent.

In both censuses the number of overloads increases, as tire thickness increases to 1.5 inch and decreases above that thickness.

The weighted average overload per capacity (computed on the basis of standard already defined) is 39 per cent. This is construed to mean that every third truck was loaded beyond the capacity of the truck and tires. A total of 37.5 per cent. were overloaded on the rear axle, and 40 per cent. were overloaded on the front axle.

As a result of these overload data, the following recommendations have been made with the view of mitigating the evil:

1. Classification of highways.
2. Seasonal restriction of loads.
3. Prohibition of overloads per capacity, and restriction of tire to 800 pounds per inch width.
4. Maximum body width of 7 feet, 6 inches.
5. Maximum axle loads to be determined for each make and class of trucks and placed in a conspicuous place on the vehicle.

The 20 commodities noted in greatest bulk in the second census with the weight and average haul of each are as follows:

Commodity.	Weight. (Pounds.)	Average Haul. (Miles.)
Groceries	1,039,469	44.15
Furniture	553,545	71.47
Beer	421,665	72.92
Sugar	404,640	47.26
Household goods	375,495	99.81
Meat products	334,410	42.75
Rubber goods	279,020	82.96
Vegetables	176,893	37.68
Poultry	159,760	32.67
Cocoa beans	158,518	33.12
Merchandise	153,831	42.88
Wire	145,550	66.50
Grapes	141,220	48.56
Bananas	133,627	47.13
Dry goods	133,360	43.79
Feed	131,140	27.10
Silks	125,305	110.22
Lumber	119,805	35.51
Machinery	115,875	89.10
Litharge	114,370	106.25

The longest average hauls reported were those of boats and yeast, each of which was hauled an average distance of 150 miles. The volume of these commodities hauled were: Boats, 840 pounds; yeast, 10,445 pounds.

The shortest haul reported was that of charcoal, 2,150 pounds of which were hauled an average distance of 3.5 miles. The next shortest haul was milk, 4,725 pounds of which were hauled an average of 5.8 miles.

Agricultural products make up only 14.3 per cent. of the traffic in the second census; manufactures and miscellaneous 7.25 per cent., indicating, according to the report, that truck movement in Connecticut is predominantly that of manufactured goods of high value and small bulk. Because the survey was limited to one season all agricultural products are not represented in the list of commodities.

The average haul of agricultural commodities is 39.5 miles; the longest, eggs, is 68.2 miles. Extending observed weights and hauls during the period of the second census it is estimated that the annual ton-mileage of agricultural commodities is 86,649.

The estimated value of the agricultural products hauled both ways over Boston Post Road at Greenwich, based on observations of the second census, is $15,075,000.

Comparing the truck traffic observed in the second census with the traffic over the New York, New Haven & Hartford and the Boston & Maine Railroads, the results are as follows:

	By Truck.	By N. Y., N. H. & H. (1918)	By B. & M. (1920)
Products for agriculture	14.3	9.4	11.8
Products of animals	11.2	3.3	3.2
Products of mines	0.5	42.5	36.8
Products of forests.	1.5	6.5	13.2
Manufactures and miscellaneous	72.5	38.3	3.50

Total observed eastbound truck traffic, second census, 239,562 ton-miles. Adjusted to give 24-hour traffic for the 2-week period, 360,000 ton-miles, eastbound. Seventy-one per cent. of eastbound traffic loaded; thirty-six per cent. of westbound traffic loaded. The estimated traffic both ways for the 2-week period was 540,000 ton-miles. Assuming this traffic to be average for the year, the annual east-and-west movement at Greenwich is estimated at 14,040,000 ton-miles of pay freight. The average haul of truck movements was 47.44 miles.

Car Lines Apply 'Buses

The Northern Ohio Traction & Light Company gives promise of solving the 'bus and "jitney" competition which has grown keener in Akron during the past few years by becoming the city's largest 'bus operator. The first move in this direction, placing of three 'buses in operation in residential districts, has already taken private 'bus and "jitney" competition from the field, and other 'buses are being ordered. Private 'bus owners fear the company will soon monopolize the public vehicular passenger traffic.

Because of the large number of automobile owners who lost their jobs in the rubber and other factories in Akron when the depression came, the number of privately owned automobiles used to haul passengers increased until 2,500 were licensed in the city. Returns to owners were variously estimated. The revenue lost to the street-car company added to the normal losses contingent upon the depression made the situation difficult for the company.

The type of 'bus was growing materially better at the beginning of the year and the number of passengers hauled larger, when it was suggested to the company that only by going into the 'bus business could the competition be met. The company instead of operating the new 'buses from the end of the street-car line to outlying districts and transferring passengers at the end of the line, operates the 'buses into the center of the city, where transfers are given to the regular street-car system. This class of competition, with full security in case of accident to the passengers, excellent 'buses and a rigid adherence to schedule resulted in the company obtaining the business formerly in private hands.

How far this plan will go is problematical, although it is admitted by some officials that except for the traffic congestion which would result, some of its lines would be replaced by the 'bus system.

Seek Truck Rating Formula

Investigations and experiments are being conducted by the National Motor Truck Committee of the National Automobile Chamber of Commerce in coöperation with highway officials, to arrive at a formula for motor truck weights. It is sought to determine by the weights of the component parts of a truck in comparison with the tonnage capacity, a standard of construction for the various tonnages. The formula will make possible a basis of rating, it is pointed out.

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What the Post-Office Does With Trucks

By T. G. MALLALIEU

General Superintendent, Division of Motor Vehicle Service, Post-Office Department

THE successful haulage business of the present day is one that makes a reasonable profit after giving its patrons the maximum service at the minimum cost. These conditions are possible only where the means employed are both efficient and economical. There can be neither efficiency nor economy where there is lost motion, and lost motion exists where the vehicle is consuming when it not producing. The facil ity must also be dependable and this reduces the field of selection to vehicles that can be operated during adverse weather conditions.

The postal establishment, employing a personnel numbering approximately 326,000 employes, is undoubtedly the largest business establishment in the world. It is a public enterprise operated without a view to profit, giving the maximum service at the minimum cost; it is imperative therefore that only efficient and economical methods be utilized in moving the mails.

Prior to October 1, 1914, the number of motor trucks used in mail transportation was almost negligible. But since that date the Government has been installing its own equipment; at the present time the Post-Office Department is operating 4,000 trucks and 700 motor-cycles, distributed among 286 of the largest cities and towns.

As the result of more than seven years' experience in the use of motor vehicles, it has been demonstrated clearly that they have many advantages over horse-drawn equipment, even where the distance to be traveled is short, although a larger saving naturally results where long hauls are involved.

The requirements of the transportation service of the postal establishment are quite different from those of any other line of business, as the flow of the mail fluctuates with the seasons and there are peak periods each day, while on certain days of the week the volume is much greater than on other days. Furthermore, all service is performed on scedules based on the arrival and departure of trains, steamships, etc., or on the beginning and ending of letter-carrier delivery. It is, therefore, necessary to maintain at all times sufficient equipment to meet the needs of the peak periods.

Speed is a salient factor in the transportation of mail, as the public demands that its mail be handled promptly. The importance of expedition as applied to the mail service will be readily appreciated when it is known that during the current calendar year more than 12,000,000,000 letters will require transportation service—1,400,000 letters every hour. The bulk of the day's letter mail, approximately 60 per cent., is posted by the public between 5 and 8 o'clock p. m., when the hourly rate of handling approximates 6,666,666, or 111,111 letters a minute. Accordingly, should it be necessary to transport all letter mail to a railroad station, steamship dock vehicular transportation is required, and the distance involved is from a half to one mile, there would be a delay in delivery of 333,333 letters by horse-drawn vehicles in lieu of motor trucks.

The maximum service that may reasonably be expected of a horse under the conditions prevailing in the mail service, where travel is over paved streets and usually through congested districts, is about 8 hours per day, 5 days per week, with a maximum of daily travel not exceeding 24 miles. The saving that will result from the use of motor trucks in comparison with horse-drawn vehicles is conspicuously apparent when it is stated that many of the trucks used by the mail service cover in excess of 100 miles per day, working on two tours aggregating from 12 to 16 hours per day. These trucks are used in making collections from letter-boxes and are operated by letter-carriers, whose compensation beginning with the fifth year service is at the rate of $1,800 per year. It would require 4 horse-drawn wagons and 4 letter-carriers, working 32 hours per day in the aggregate, to perform the same service that is rendered by two 750-pound trucks and two carriers working from 12 to 16 hours per day.

In one city where a portion of the letter-box collections and parcel-post delivery service was motorized, 95 trucks of 750-pound rating operated by 152 letter carriers and 17 carriers on foot, superseded 240 horse-drawn wagons driven by an equal number of letter-carriers. This saving expressed in dollars and cents based on present-day operating cost and the maximum pay of letter-carriers is in excess of $30,000 per year. In addition to the money saving, the collection of the mail was materially advanced.

Horses have to be fed whether they are used or not, and their value is constantly on the decline. These conditions are not with respect to motor trucks, as they are not consuming when not in operation, and the depreciation when idle is negligible. The importance of this citation is obvious when it is known that in the mail service only a small percentage of the regular week-day transportation is required on Sundays and holidays and these days amount to more than 16 per cent. of the days in a year.

A very forceful illustration of the dependability of motor trucks, as compared with horse-drawn vehicles, resulted from extremely adverse weather conditions in one of the very large cities during the month of February, 1919. The department had a contract with a trucking corporation for furnishing 70 horse-drawn wagons, for use in delivering parcel-post matter in the badly congested sections of the city, and during 3½ days when the storm was at its height, the contractor was unable to furnish a single horse-drawn vehicle, while the motor trucks owned and operated by the postal service continued to function in a creditable manner, although it must be admitted that schedules were not adhered to strictly.

There is another phase of the transportation problem, while it has no bearing on the efficiency or economy of the means employed, should, nevertheless, receive more consideration in the future than it has in the past. I have reference to the common practice of working horses during the extreme heat of the summer or cold of the winter also without sufficient food or water. Organizations have been formed all over the country for the prevention of cruelty to animals, cruelty not only in treatment, but also in use. This condition can be eliminated entirely by the substitution of mechanical means for horse-power.

The motor truck has demonstrated its superiority as a dependable means for the efficient and economical transportation of mail.

Clydesdale 1½-Ton Truck

A new member of the Clydesdale family, an all-steel truck with speed, has been announced by A. J. Banta, vice president and general manager of the Clydesdale Motor Truck Company of Clyde, Ohio. This truck, supplementing the company's line of medium and heavy-duty vehicles, has an overall capacity of 6,850 pounds, including weight of chassis which is 3,100 pounds, giving a carrying capacity of body and load of 3,850 pounds.

The chassis, including starting and lighting systems, is to be offered at $1,485, f.o.b. Clyde. This price is only possible, explains Mr. Banta, "because of the recent reductions in the cost of materials."

"This chassis marks a distinct advance in the construction of light trucks, and a glance at its specifications will convince the most skeptical that it is built not for looks and speed alone, but on time-tried principles for hard, practical service," said Mr. Banta. "Our announcement, I believe, will prove of interest to the hundreds of Clydesdale truck owners who have found the vehicles reliable, serviceable and efficient, as well as economical in up-keep. And I am sure we have in this all-steel truck a vehicle that will uphold the reputation of the company and justify our pride in it. Months have been spent in scientific tests of this chassis."

W. C. Ames has been appointed district sales manager of the Sharon Pressed Steel Company at 20 East Jackson boulevard, Chicago, and Ralph E. Phillips district sales manager with headquarters at 66 Broadway, New York City.

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English Fuel Report Shows the Possibilities of Alcohol

Results Already Attained Are Very Encouraging and Presage Even More Interesting Findings in New Tests

THE Empire Motor Fuels Committee of the Imperial Motor Transport Council of England has now issued the interim report of the Engineering Sub-Committee, giving results of a comprehensive and complete scientific investigation of the behavior of alcohol in internal-combustion engines. This report, which is given practically in full below, was referred to the committee of the council of the Department of Scientific and Industrial Research, which makes a grant to this branch of the Empire Motor Fuel Committee's investigations. It was decided that a complete range of experiments should be carried out with 95 volumes per cent. alcohol, as this was the strongest alcohol produced in commerce by the patent still. Through the kindness of the Asiatic Petroleum Company, the committee was allowed to make use of the Ricardo variable compression engine which had been designed and built for that company.

It should be added that the government authorities gave permission for the experiments to be carried out with pure alcohol, so that there should be no difficulties introduced in this fundamental work by the presence of denaturants.

The experiments which it was decided to carry out were divided into four series:

1.—Tests for power output and consumption over the complete available range of mixture strength with open throttle at four different piston speeds from 800 to 2,000 feet per minute and at compression ratios of 3.8-1 and 7-1, with constant heat to the carbureter.

2.—Tests of power and efficiency over complete range of mixture strength at 0.8, 0.6, and 0.4 of full load with piston speeds of 1,200 and 2,000 feet per minute and a compression ration of 5-1, with constant heat to the carbureter.

3.—Tests over complete range of mixture strength at piston speed 2,000 feet per minute, compression ratio 5-1, constant heat to carbureter, but with the circulating water at the outlet varied from 30° C. to 90° C.

4.—Tests over the complete range of mixture strength at 2,000 feet per minute piston speed, at a compression of 5-1, varying the heat input to the carbureter from *nil* to 2,000 watts.

"It was found that at all speeds, both with high and low compression, the thermal efficiency obtained with alcohol was higher than that obtainable with gasolene or benzol at any compression which could be employed with them," says the report. "Even at the low compression of 3.8-1, the thermal efficiency with alcohol is substantially greater than that obtained with gasolene under similar conditions. In both cases the efficiency is almost independent of speed. The heat delivered to the circulating water is less in proportion with alcohol than with gasolene.

"It was further found that, compared with gasolene or benzol, the thermal efficiency obtained with alcohol is equally high at high or low compression.

"The tendency to pre-ignition began to be evident at 7-1 compression ratio.

"Owing to the lower heat value of alcohol, the fuel consumption is much higher than is the case with gasolene in spite of the higher thermal efficiency, if they are used at the same compression, but the fuel consumption can be reduced much further in the case of alcohol than in the case of gasolene by increase of compression ratio.

"The throttle tests (series 2) have shown that the behavior of alcohol and gasolene under variations of throttle conditions was identical.

"The influence of jacket water temperature was investigated (series 3) and showed that the power output from the engine was slightly diminished with increasing jacket temperature. The efficiency also fell slightly, as is the case with all other volatile fuels investigated. The reputed increased power obtainable with alcohol engines with hot water jacket is probably much more due to the diminished piston friction in the warm cylinder than to any other cause.

"The experiments in series 4 have shown that the maximum output from the engine is obtained when no heat is supplied to the ingoing air, but the thermal efficiency is slightly increased with increase of heat to the carbureter.

"It has been proved that under all conditions of compression speed or throttle alcohol-driven engines run more sweetly and more smoothly than when running on gasolene. Detonation never occurred under any compression employed, but at 7 to 1 compression, corresponding to a pressure of 185 pounds per square inch, there was a tendency to pre-ignition; 6½ to 1 is probably the maximum compression to be aimed for.

"There have been no evidences whatever of any corrosion of valves.

"It must be remembered that these experiments have been carried out on a single-cylinder engine, and that in practice troubles and difficulties introduced by induction manifolds may render it desirable to sacrifice efficiency in some directions to gain flexibility and acceleration. Nevertheless, the series of experiments which have been carried out have led to the accumulation of fundamental facts and figures which must be of the greatest value to the industry in the near future.

"It was decided by the committee that further experiments should be carried out on similar lines to those above referred to, but with alcohol at 99 and 90 volumes per cent. strength. The results obtained with these fuels substantiated the earlier work, and proved that the mean effective pressure increases as the water content is increased, so long as the whole of the fuel and water is completely evaporated before the end of the compression stroke. The power output was increasing slightly even with 90 volumes per cent. alcohol. The behavior of the varying amounts of water was studied over compressions ranging from 3.8-1 to 7-1, and it was proved that the presence of water in all cases increases the maximum power output and reduces the heat flow through the cylinder walls. In high compression engines there is a substantial advantage in using alcohol containing a reasonable amount of water.

"In conclusion, it is impossible in a brief interim report to deal with all the points which our experimental work has already touched upon, but it has definitely been proved:

"(1) That alcohol can be employed from the low compression employed on kerosene engines up to a far higher compression than can be used on any gasolene.

"(2) That the thermal efficiency obtainable with alcohol is higher than with gasolene or benzol.

"(3) That under all conditions of throttle or mixture alcohol requires the spark more advanced than is the case with gasolene or benzol, and much more advanced with the weak mixtures.

"(4) That there was no evidence at any piston speed attained in the engine that the rate of combustion of alcohol under the conditions obtaining was too slow to obtain the maximum effect.

"(5) That detonation does not occur at compressions up to 8 to 1, and pre-ignition does not occur at 6 to 1, even when running for long periods at the highest possible power output of the engine.

"(6) That there was no evidence whatever of corrosion in the engine.

"(7) That the power output and efficiency are increased by low temperature of the circulating water.

"(8) That supplying heat to the carbureter reduces the power output, but slightly increases the thermal efficiency.

"(9) That increase in the water contents up to 10 volumes per cent. is an advantage, particularly in very high compression engines.

"These brief conclusions require to be interpreted in the light of the fuller knowledge obtainable from the complete reports. A new series of experiments is now in hand with a view to investigating the influence of ether on alcohol, and the influence of alcohol on gasolene, benzol, paraffin, and the like. It is believed that this work will prove of considerable value to the motor industry, as it is probable that the first introduction of alcohol on any scale as a motor fuel will be in the form of an admixture of the same with other ingredients."

A further series of investigations in the behavior of mixtures of alcohol and ether in varying proportions is now approaching completion, and will form the subject of the next interim report of the Engineering Sub-committee.

The United States has invested about the same amount in motors as it has in steam railroads.

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Four Trucks Equal 75 Men

Four years ago W. E. Jones, general manager of the Associated Terminals Company, and C. F. Cormack, general superintendent of the Haslett Warehouse Company, San Francisco, ordered two Reliance tractors and have since purchased two more. The work done by the machines is well described in the following words of Mr. Cormack, who tells of the unloading of the "Howick Hall":

"This vessel came from New York through the canal putting into San Francisco for coal and in passing over the bar at the entrance of the harbor, the weather being rough, struck bottom, breaking the rudder and damaging the rudder post, making it necessary to remove the cargo in order to place the ship in dry dock for repairs. This cargo consisted of bales of cotton, steel plates, railroad rails, pipe, sacks of sulphate of ammonia, etc. The cargo by actual weight totaled 7,500 tons or by taking measurement on 8,940 bales of cotton and actual weight of the balance of the cargo, including 1,700 tons of steel plates, the total figure was 10,900 tons. All this cargo was handled by four of our tractors and a fleet of so-called flat-cars. The working time of the tractors was as follows: 4 tractors 10 days, equivalent to 1 tractor 40 days; 3 tractors 3 days, equivalent to 1 tractor 9 days; 2 tractors 2 days, equivalent to 1 tractor 4 days; 1 tractor 1 day, equivalent to 1 tractor 1 day, or a total of 54 working days of 8 hours each for one tractor.

"The cargo, by combining weight and measurement, equals 10,900 tons, or approximately 202 tons handled by each tractor per day of 8 hours, or, figuring by dead weight, each tractor handled 139 tons for each 8 hours, equivalent to about 17½ tons per hour. The ship worked four hatches and the four tractors were able to handle all the cargo as fast as it could be discharged, the average distance trveled by each tractor on each separate trip being about 600 feet.

"We figure that 4 men and the 4 tractors did the work which, if the cargo had been handled by the ordinary method of trucking, would have required the services of something like 75 men. We have been using these tractors in our regular work of hauling beans from the wharves on the waterfront to our Gibraltar Warehouse, corner of Filbert and Sansome Streets, and in the nearly two years that we operated the first machines bought, the cost of maintenance has been almost negligible and the work performed by each tractor has been more than we would have been able to do with the average 5-ton truck.

"We find these tractors very satisfactory and very profitable in our work as they fit in on short-haul work in combination with the trailers better than any other method we have been able to devise and we also find them useful at times in piling bales by means of block and tackle, etc."

In the past six months Connecticut motor owners spent $7,500,000 for gasolene, according to the department of motor vehicles, and inasmuch as the state tax is one cent a gallon the officials are sure of the figures.

Truck Hauls Produce at 63 Cents a Ton

By C. T. DICKERSON

Mitchell-Dickerson & Company, Newark, New Jersey

WE ARE one of the largest produce commission houses in Newark, and make a specialty of car-load lots. Most of our customers are wholesalers, although we have a number of retailers also on our list. Before the war we used to hire our hauling done, partly by trucks but mostly by teams. The principal objection to this method was that we could not depend on the hauling contractors being on the job when wanted, so we were unable to give our customers the good service we wished to give them. A second objection was that horses couldn't handle deliveries at any considerable distance.

For these two reasons we decided to do our own hauling with motor trucks, so we purchased a 3½-ton Selden. This truck was put to work handling our freight station and delivery work, and has been in operation for the past 4 years.

Each week day it makes an average of 4 trips to the railroad station and brings back 3½ tons of produce to the store. Then it makes about 2 trips on various routes, delivering to wholesalers and retailers, usually carrying 3½ tons. On these trips it averages 3 stops. The truck covers all Newark and the neighboring Jersey towns, including Roselle, 8 miles away, and Paterson, 15 miles away. This latter city is about the maximum distance the truck goes.

In its four years' service this truck has run approximately 29,000 miles, an average of 25 miles per day operated. It has been laid up for repairs only 2½ months during the 4 years. A considerable part of this time was spent in overhauling the truck, as we give it a thorough overhauling every two years, besides maintaining it carefully.

During its 4 years the truck has cost us about $1,000 for maintenance and repair, including two overhauls. As it has just received its second overhaul, and is in first-class condition, we estimate that $200 for maintenance and repair will be ample for the next two years. At the end of that period we expect to turn it in toward a new truck.

The truck averages 14,500 miles on tires, and 5½ miles to the gallon of gasolene. In figuring that it is good for a total life of 6 years, or 45,000 miles, we believe we are conservative, because the truck is in good condition now, and will continue to be carefully driven and maintained.

This 3½-ton truck costs $13.14 per day, 63 cents per ton, and 30 cents per ton-mile. As we know by both experience and observation, these are unusually low costs for this class of work. They are especially creditable in view of the low daily mileage made.

The truck has undoubtedly saved us a considerable amount of money over our former cartage cost, though just how much we can not estimate. Probably its greatest advantage, however, is the increased business it has brought us by assuring our customers efficient delivery service. That means a lot to them, because their customers in turn are waiting for the goods purchased from us. We estimate that the increase in our business from this source alone easily amounts to 20 per cent.

A summary of our cost record follows:

Performance.	
Period covered	4 years
Days operated	1,160
Total round trips	6,960
Deliveries—pick-ups	11,600
Loads out (tons)	8,120
Loads in (tons)	16,240
Total loads (tons)	24,360
Miles traveled	29,000
Gasolene used (gallons)	5,273
Cylinder oil used (gallons)	580
Round trips per day	6
Deliveries—pick-ups per day	10
Loads out (tons) per day	7
Loads in (tons) per day	14
Total loads (tons) per day	21
Miles traveled per day	25
Miles per round trip	4.16
Loads per trip (tons) both ways	3.5
Ton-miles (loads both ways)	43.68
Miles per gallon gasolene	5.5
Miles per gallon oil	50
Investments:	
Chassis	$3,150.00
Body	450.00
Total investment	$3,600.00
Tire value	311.70
Total less tires (to be depreciated)	$3,288.30
Fixed Charges—Yearly.	
Interest on total investment @ 7%.	$ 252.00
Taxes and licenses	105.00
Insurance	275.00
Garage expenses	168.00
Total per annum	$ 800.00
Total per month (per day $2.76)..	66.66
Total for period—4 years	$3,200.00
Variable Charges—Period.	
Fuel at 30 cents gallon	$1,581.90
Cylinder oil at 45 cents gallon	261.00
Tires—29,000 miles ($311.70 ÷ 14,500-mile life)	623.40
Depreciation—29,000 miles $3,288.30 ÷ 45,000-mile life)	2,119.90
Maintenance and repairs (estimated)	800.00
Total variable charges	$5,386.20
Driver's wages	6,656.00
Total fixed charges	3,200.00
Total operating cost	$15,242.20
Cost per day operated	$13.14
Cost per mile traveled	.52
Cost per ton hauled	.625
Cost per ton-mile	.30
Repair cost per mile (estimated)...	.027

Motor Vehicles in Alaska

During 1921 the United States shipped to Alaska 70 passenger-cars valued at $75,242 and 15 motor trucks valued at $11,279. The registration of motor vehicles in Alaska shows a total of 384 passenger-cars and 153 motor trucks, distributed as follows:

Cities.	Passenger Cars.	Motor Trucks.
Juneau (Capital)..	100	53
Ketchikan	85	50
Anchorage	40	20
Fairbanks	150	30
	384	153

It is safe to assume that there are 100 additional machines in the Nome section and small towns of the territory. The use of motor vehicles is expected to increase, especially in the Matanuska and Tanana Valleys.

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White Evolves Rail Motors for Passengers and Baggage

CAPACITY OVER 40, SPEED 33 M. P. H.

The White Company, Cleveland, has designed two new types of rail motor coaches: one having accommodations for 42 passengers and no baggage, the other built to carry 41 passengers in addition to a limited amount of baggage in a separate compartment. Both vehicles are 39 feet 11 inches long in the body (exclusive of the cow-catcher and markers), 9 feet 6 inches wide, and 10 feet 11 inches high from the rail to the top of the ventilators when loaded. The 42-passenger coach has 14 cross-seats, each seating 2 persons, a longitudinal seat at the front seating 3 persons, another seating 5, and a crosswise seat at the rear for 6. The aisle, which is at the center, is 26 inches wide. The 41-passenger coach has 7 cross-seats seating 2 persons each and an equal number seating 3 each, two folding cross-seats, and a crosswise seat for 6 at the rear. The aisle, which is a little to the left of the center of the vehicle, is only 22 inches wide. The baggage compartment, about 8 feet square, contains two folding seats, one behind the driver for 3 persons and another opposite for 2.

Both chassis have been specially designed for the service to which they are to be applied. Each uses a model 45 White unit power-plant, driving through a cardan shaft to the standard White double-reduction rear axle, and each has a 4-wheel bogie in front and two driving wheels in the rear. Brakes are applied to the front wheels as well as to the rear wheels and the drive shaft, and in addition regular rail-sanding equipment is provided as in standard railroad practice. The machines are geared to a maximum sped of 33 miles an hour. The specifications in detail follow and apply to both types except where otherwise stated:

Speed.—Forward, 33 miles per hour; reverse, 9 miles per hour.

Power-Plant.—Engine, clutch and transmission embodied in a unit power-plant. Engine of 4-cylinder monobloc type; bore, 4¼ inches; stroke, 5¾ inches. Lubrication by pressure-feed to crank-shaft bearings and lower end piston-rod bearings, by spray from crank-shaft bearings to piston-pins and pistons. Clutch of single-plate type, operates in oil. Cooling; positive water circulation by gear-driven centrifugal pump. Radiator of vertical tube type supported on springs. Transmission of selective type with 3 speeds forward and one reverse.

Fuel Storage and Feed.—Gasolene tank located under right-hand side of coach. Capacity 30 gallons. Feed to motor by vacuum system.

Chassis Frame.—I-beam.

Springs.—Semi-elliptic, front and rear under frame. Helical springs over journal-boxes on pivotal truck.

Rear Axle.—Double-reduction gear drive. Gears entirely inclosed and run in oil. Rear wheels of cast-steel with locomotive type steel flanges and annular ball-bearings.

Brakes.—Brakes on rear wheels, drive-shaft and pivotal truck wheels.

Controls.—Operating controls on extreme forward right-hand side of coach. Drive-shaft brakes, foot throttle and clutch operated by pedals; rear wheel brakes and sander mechanism by levers; brakes on pivotal truck by hand-wheel. Ignition and throttle levers on hand-wheel. Oil-gage, ammeter and switches on instrument board in front of operator's position.

Rear-End Safety Control.—Means provided in rear of coach to disengage clutch and apply brake in emergency.

Engine Cover.—Housing over engine to keep fumes from entering coach.

Electric Equipment.—Two-unit electric starting and lighting system with storage-battery.

Pivotal Truck.—Outside bearing type with cast-steel side members, brass bearings, 20-inch wheels with M. C. B. tread and flange. Wheel-base, 4 feet. Shoe-type brakes on all wheels.

Body Types.—42-Passenger Coach without baggage compartment, and Combination Type Coach—41 passengers and baggage compartment. Body equipment, pivotal truck, rear wheel flanges and other rail equipment are supplied by the J. G. Brill Company.

Body Construction.—Framing of steel construction. Sides sheathed with patent beveled sheet-steel rivetted to posts, joints covered with sheet-steel splice plates.

Flooring.—42-Passenger Type: Tongued and grooved yellow pine laid lengthwise with aisle mat strips of tapered maple provided full length of coach; ⅛-inch asbestos lumber insulation applied under floor and held with metal strips. Combination Type: Flooring in passenger compartment same as in 42-passenger type; 1⅛-inch yellow pine in baggage compartment.

Roof.—Plain arched roof the full length of body. Roof boards of tongued and grooved poplar covered with canvas. Roof strengthened with steel rafters.

Doors.—Single swing-type doors on each side of front end of passenger compartment. Metal trap-doors over step openings. Single sliding-type baggage door on each side of baggage compartment on combination type coach. Swing-type door in partition between passenger and baggage compartments. All doors glazed with double strength American glass in upper portions and paneled in lower.

Windows.—Top sash stationary and continuous, lower sash to raise except two windows in operator's cab which drop and have racks to hold sash at various heights. Sash glazed with double strength American glass and equipped with weather strips, metal sash stiles and bronze fixtures for Brill Renitent post casings.

Partitions.—Partitions in combination type coach between passenger and baggage compartments. Partitions can be provided in passenger compartment of either body.

Curtains.—Each window equipped with Pantasote spring-roller type curtain.

Seats.—Passenger compartment seats of pressed-steel construction with backs and cushions upholstered in cane. Grab handles on backs of cross-seats. Slat seat on each side of partition door in baggage compartment. Operator's seat of spring type, upholstered in brown imitation leather.

Operator's Cab.—Operating controls and seat inclosed. Rear of inclosure in 42-passenger coach fitted with swing-type door; in combination type coach with curtain mounted on roller.

Inside Finish and Trimming.—Passenger Compartment: Ceiling carline finish; Agasote side linings below window-sills; doors, sash and mouldings of cherry. Card racks provided on each side. Trimmings of statuary bronze finish. Baggage Compartment in Combination Type: Lined with popular tongued and grooved sheathing from floor to top rail, doors of ash. Iron grab handles provided over steps.

Ventilators and Heaters.—Exhaust ventilators with shutters located in center of roof. Engine exhaust heating system.

Sanders.—Brill Dumpit type complete with sand hose. Located under coach at front and rear of driving-wheels.

Signaling Devices.—Electric signaling device. Loose hammer attachment type conductor's bell with Samson cord full length of body.

Emergency Equipment.—Two Pyrene fire extinguishers. Two emergency tool boxes, each containing saw, axe, crow-bar, sledge and canvas pail. One Brewer first-aid kit.

Coach Lights.—42-Passenger Coach: Twelve dome lights on ceiling, one light in operator's cab, and one light over each step epening. Combination Type: Eight dome lights on ceiling in passenger compartment, two lights in baggage compartment, and one light over each passenger step opening.

Head-Lights and Marker Lights.—Electric head-light at front and rear of coach; two combination oil and electric marker lights at rear.

Pilot.—Locomotive type.

Painting.—Exterior color and lettering to suit purchaser. Interior of natural finish.

Spicer Will Buy Hartford Parts

Unless depositing creditors of the defunct Hartford Automotive Parts Company raise substantial objection, the Spicer Manufacturing Company will purchase practically all the assets and property of the former concern, organize a new corporation, and carry on the business. Non-depositing creditors will receive about 45 cents on the dollar in full settlement of their claims. The rest of the creditors, it is believed, will eventually get a very much higher percentage of returns as their distributive share. These are the prominent features of a statement issued by the Creditors' Committee of the Hartford company under date of May 13 to the depositing creditors.

The Hartford company was bought at auction for $350,000 on May 3 by the Creditors' Committee. The Spicer company will organize a new corporation and $220,000 in cash will be paid the committee. Of this, $120,000 will be raised by the Spicer company on the note of the new corporation. This latter will have an issue of $330,000 of 7 per cent., non-cumulative $10 par value, and $100,000 of common stock, $100 par value. The committee will receive $230,000 par value of this preferred stock issue. The committee will retain all the real estate and buildings and lease it to the new corporation for five years with option of a five-year renewal. The net rental will be $6,000, payable in quarterly installments. The real estate is subject to mortgages aggregating $75,000 but the committee believes that it can be sold at the proper time for a price that will take care of the liens and leave a considerable amount of cash for distribution to the depositing creditors.

The proposed agreement with the Spicer company provides that no dividends shall be paid upon the common stock until the preferred has been retired. The $120,000 purchase note must be paid before any other indebtedness, however, and no preferred dividends will be paid until it is taken up. In the event any of the machinery now installed be sold and no new devices purchased to replace it, the agreement provides the creditors be given the cash thus realized. The committee also retains the right to name one director on the new corporation's board and the new concern must at all times maintain current assets at a sum equal to twice the amount of the current liabilities.

The receiver for the Hartford company had on hand about $69,000 at the time of the sale at auction, the committee points out, and on this figure it makes its prediction that approximately 45 per cent. will be paid non-depositing creditors. May 19 was set as the last day for registering objections to the proposed liquidation plan and the committee intends to close the contract with the prospective purchaser as soon thereafter as possible. The committee consists of A. E. Brion, L. R. W. Campbell, E. L. Streeter, Jr., B. P. Greene and R. N. Denham.

On May 1 the New York offices of the American-LaFrance Fire Engine Company, Inc., and of S. F. Hayward & Company, its subsidiary, were moved from 250 West 54th Street to the new Fisk Building on 57th Street between Broadway and Seventh Avenue.

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The Motor Transport Clearing-House

By TOM SNYDER

Chairman, National Committee on Highway Transport Clearing-Houses

A FEW years ago the highway transport clearing-house was considered as a possible future in highway transportation, today it is seen by all those who try to apply motor transport as a definite dependable service in transportation, an absolute necessity. It can be safely said that intercity motor express, or rural motor express, cannot be generally and successfully applied except through the service of a motor transport clearing-house. The successful operation of one, two or three trucks from some shipping center out to some rural community or to a number of small towns is but one step in the experimental stage, and is not sufficient evidence of the applicability of motor transport as a definite system of transportation.

The big question coming from the shipper, the consignee, the public and the railways to-day is: Can the highway and the motor truck take the short-haul L. C. L. freight from the railways? Even if the answer is "yes," with the provision that time for its proper development must be allowed, it immediately suggests system, uniform methods, and crystallization. We can not build confidence, nor can we hold confidence already developed, by telling the shipper that he can have motor transport service over the Jackson Highway, but not over the Lincoln Highway, that the carrier rate over the Jackson Highway is 2 cents per 100-pound-mile on first class with a varying rate for lower classifications, while the carrier rate over the Great Lakes Highway is 1½ cent per 100-pound.mile, with no classifications, that there is no store-door delivery charge on shipments over the Bingo Highway, but that such a service fee is collected on shipments over the Johnson Highway. We can no longer satisfy the shipper or consignee with the fact that truck operator Jones who, though he is responsible financially for the goods turned over to him, also carries a dependable cargo insurance policy, while operator Smith is not responsible and is also without insurance, but that Smith hauls for a lower rate than Jones.

The greatest need in the development of motor transport as a dependable transportation service out of all American industrial centers is the establishment of motor transport terminals and clearing-houses. A highway transport clearing-house is an established station from which highway transport shipments can be cleared from the shipper to the transportation trucks, operating over any or all highways over which transportation service is being rendered. It is a centralizing station to which jobber, manufacturer, merchant and every variety of shipper can bring his consignments, big or little, and from which rural motor express, trucks, intercity motor express trucks, highway transport trucks, load and depart according to route schedules or special service arrangements. It is also a station to which agricultural products, eggs, poultry, butter, cream, and other commodities can be shipped and cleared to consignees, be they individuals, merchants, jobbers or manufacturers.

The great service of a motor transport clearing-house will be to meet the fluctuating demand for motor transport, to fix rates, determine classifications, maintain schedules, and to educate the shipper, the consignee, and the general public as to the advantages of this type of transportation. Motor transport has not been developed as a broad dependable system of transportation. Splendid service is being rendered between many cities throughout America, and this often where the keenest kind of rail competition exists, while many rural communities in great need of motor transport service, are not served. Many routes have been established to serve communities where rail service is far below the transportation demands, but much of the service now being rendered, good or bad, is but blind adventure.

Classifications as established by the common carriers are rarely observed by the motor transport systems, the non-observance of such classifications already established being the cause of the failure in many transport adventures. Rates for transportation are as yet the most indefinite element in the entire industry. Coöperation between operators for the development of economical shippers' pick-ups and consignees' delivery systems is as yet unknown, schedules are indefinite, and service capacity often inadequate to meet the shippers' demands. These and many other barriers to the practical application and industrial economy of motor transport could be quickly overcome through a motor transport clearing-house.

A clearing house is a centralizing point of activity where ideas and methods can be cleared as well as tonnage, and highway transport is now waiting the stabilizing influence of uniform and dependable methods. Clearing-houses and the clearing-house system in all freight clearing centers are of constantly increasing importance, and as time and economy in clearing shipments are being recognized as the major portion of the transportation problem, the motor transport terminal comes rapidly to the foreground as a tremendous factor in the entire scheme of transportation.

The major portion of all shipments are consigned to a place, and not to the consignee, and, though the consignee may be a farmer or a rural merchant within a few miles of the freight terminal and though this distance may be but a fraction of the transportation distance, it is very often the most expensive leg of the service both in time and money. Transportation is not complete until the consignment reaches the consignee, and yet in our present system a very definite interruption takes place where consignment reaches the terminal, at the point nearest to destination. This interruption takes place because the rail or water carrier feels that his responsibility ends at its terminal, and the consignee is expected to complete the transportation service, with the result that terminal congestion is adding millions to the cost of transportation and additional millions because of demurrages and store-house charges.

Store-door delivery is now being considered by many of America's largest shippers as a means of providing a continuous transportation service from shipper to consignee—a service that can be extended to all consignees within motor transport distance of rail or water way terminals. Store-door delivery as a relief to terminal congestion and its many kindred evils immediately involves the application of highway transportation, as the service could profitably and practically be extended to consignees 40 or 50 miles away from terminal and to farther points if no rail service were available.

With the adoption of store-door delivery service motor transport clearing-houses would become an absolute necessity and, with the establishment of motor transport clearing-houses, the connecting link between all methods of transportation would be quickly welded. A new element of clearing freight through all terminals enters at this point, the greatest step towards improvement in transportation would be taken, and the greatest need that all common carriers are now facing would be provided. A motor transport clearing system would become the connecting link and the immediate outlet to and from all common carrier terminals. With the extension of this service to points over a 50-mile zone the benefits would be increased in proportion to the tonnage transported.

ONLY through the development of highway transport can transportation keep pace with the rapid development in production. Highway transportation will always be a comparatively short-haul service, and its

Only through the development of highway transport can transportation keep pace with the rapid development in production. Highway transportation will always be a comparatively short-haul service, and its applicability and economy will lie in its speed and flexibility. A motor transport clearing-house will provide an uninterrupted rapid transportation service from the farmyard to the industrial citizen's door, or from the wholesaler's or warehouse platform to the rural merchant's store-door. As railways are relieved of this short-haul service much of the ever-prevalent terminal congestion, and its accompanying embargoes and demurrages, will disappear and a greatly improved service in long hauls will result.

No doubt the greatest need of motor transport to-day in establishing itself as a definite mode of transportation is some system of uniform methods. Many motor transport adventures are being made around every in-

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dustrial center in America. Some of these adventures are being made by individuals who operate one, two or three trucks, other adventures embrace the operation of fleets of ten, twenty or thirty trucks. Some operators depend upon the one-way haul, such as the live-stock haulers, others regulate their service subject to a two-way load. Some operators who see the need of protection to consignments and service to shipper, provide themselves with specially-built inclosed bodies, trailers to care for unexpected service calls, dependable drivers who keep accurate records and make careful deliveries, while others pay little attention to these details, but get business because of lower transportation charges.

TRANSPORTATION rates are not uniform, some operators hauling at the common carrier first-class rate, adding a pick-up and store-door delivery charge, while others adopt an arbitrary rate above or below the common carrier rate as they see fit, and make no pick-up charge, and often no store-door delivery charge. Some operators adopt time-schedules, and make it their business to keep them, having available extra trucks in case of a break-down, while others operate very much at random.

The pick-up at shipper's platform method makes motor transport a random service, and subjects the truck operator to many delays due to shipment not being ready when he reaches shipper's platform, as the truck operator has no control over shipping departments, and as limited platform space may cost him many delays he has no chance of fixing schedules for reaching the shipper. The pick-up at platform method prevents operators from loading consignments to the truck and provides for an unloading order; his last consignment picked up might be consigned to the last stop on his route or the reverse. A motor transport clearing-house would make possible the elimination of all of these evils, in fact its very service would be the adoption of a system of uniform methods, first for the information of the shipper and consignee and, second, as a service to efficient transportation.

Large industrial centers with well populated surrounding territory will require an outbound and inbound building or section. These terminals could be established and sustained as a private enterprise and be made profitable through a terminal hundred weight or package fee, to be added to the transportation charge, and through the operation of a cartage system which would be in great demand on pick-ups and deliveries to consignees and from shippers who do not operate their own cartage vehicles and from thousands of individuals who, through highway transport and motor terminal service, will become the consignees of agricultural producers. These terminals should be established and sustained through the coöperation of wholesale shippers' associations, farm federations, and motor transport organizations.

The building should be long and narrow providing the greatest possible amount of platform space on each side, insuring relief from either building platform or vehicle congestion. It should be divided into route sections, local cartage vehicles delivering to a platform on one side of the building within the route sections according to consignments; these consignments being handled through a narrow building to the outbound platform for shipment that day, or left within the building if scheduled for following day shipment.

The inbound building or section should be of the same character, permitting inbound transport truck to unload cargoes on one side of the building, and local cartage vehicles to clear from the opposite side.

Because of the flexibility of motor transport, terminals will be very well cleared daily. For the outbound terminal shipments consigned to routes over which less than daily service is rendered should not be received earlier than one day prior to the scheduled departure of the truck. Schedules should be established over all routes, offering tonnage in exchange for service, the terminal clearing-house keeping all shippers informed as to schedules, transport rates and service offered.

The first service of a motor transport clearing-house would be to provide a freight-station through which highway transport shipments could be cleared from the shipper's vehicle to the transport truck, and from the transport truck to the cartage vehicle, but its greatest service would be to act as an intelligence bureau. Any common carrier can give the shipper all details as to rates, classifications, distance and service schedules over its own lines, but has no interest in the same conditions over other lines. In highway transport every highway leading out of every industrial center in America becomes a transportation line to the shipper, and each of these transportation lines may have a varying number of transportation operators rendering service over it. A highway transport clearing-house at which all operators should register their service schedules could issue complete bulletins to shippers, and thus supply shippers with the very information which they need, but without such a clearing-house they have no way of securing it.

Many private truck owners can be found within or around industrial centers with whom contracts can be made to operate over highway routes on schedule if the terminal clearing-house will centralize the industrial demand for service. In smaller towns and cities in which highway tonnage is not great enough to sustain a motor transport terminal, storage warehouse and regular transfer or trucking firms are rapidly taking on this service and, because many of them operate a cartage business in connection with warehousing, or are regularly engaged in cartage service, find that it fits in splendidly and adds to their regular business.

It may seem unreasonable to say that the public can not avail itself of the advantages of highway transportation, but this is true nevertheless. A great majority of regular shippers are deprived of this transportation resource, because only those, whose consignments over given routes are sufficiently large to warrant special arrangements for such service, can secure it. The agriculturist can not consign a bag of potatoes to the industrial or city consumer, because of the absence of a clearing-house through which the potatoes can be cleared to a city cartage vehicle, nor can he consign a crate of eggs or any other products to the city retailer or broker for the same reason.

The theory, that all shipments to be transported by motor truck can be picked up at the shipper's platform by the transport truck, and that the highway transport truck can also deliver to the store-door or be successfully applied as a cartage vehicle, must be given up. This statement may excite considerable opposition, because so much has been said and written about the motor truck rendering a service direct from shipper to consignee and that because of such service unnecessary handling of freight has been saved, which is all true, but which will be the special or rare case when motor transport is broadly applied as a definite link in the whole service of transportation.

I know of no important industrial center in America from which (within the next six years) less than eight different motor transport routes will be operated, and from some centers this number may be increased to from twenty to thirty. It would be a daily occurrence for some shippers to have consignments for each of these routes, and limited platform space which has long been a menace to American industry would prevent the transport truck, from each of these routes, picking up its route consignments.

Many shippers have said that they would gladly use motor transport for all short-haul consignments, if their shipping departments could load motor transport consignments to their own freight delivering vehicles, to be dropped off at a motor transport terminal while making daily deliveries to all other terminals. A public motor transport terminal and clearing-house becomes a gateway to and from all highways; it will supply that definite point of contact which highway transport now lacks; it will develop that responsibility, and dependability which the shipper wants; it will become a crystalizing point from which an analysis of possibility and application of motor transport can be made; it will make every citizen in every industrial center of America the consignee of every producing farmer within 50 miles of that industrial center. Every rural merchant in this same territory will be brought within 6 hours of his base of supply.

THE highway will never serve its ultimate purpose until every citizen, consumer or producer has dependable and practical access to it, and this is not possible except through a highway transport terminal and clearing-house. As evidence of the need and constructive advantage of motor transport clearing-houses, Indianapolis no doubt offers the best illustration in America. Motor transport routes have been operated out of Indianapolis for the past eight years and up to the summer of 1921 nine operators out of ten went down in failure and defeat. Indianapolis has seven steam and twelve electric traction lines radiating from it in all directions and the successful application of motor transport with such competition requires system. In 1920 a clearing house system was organized and began the work of standardizing motor transport, fixing routes, establishing schedules, fixing rates, adopting a uniform bill of lading and freight receipt, with the result that, com-

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mencing April 15, 1922, ten definite intercity motor express routes, all operating out of one terminal freight-house and under the direction of one clearing-house, each route being handled by one or two different operators, were put into service.

The shipments for all these routes are solicited by a personal and telephone canvass through the clearing-house, and it is the rare thing to find any of these trucks leaving the city with less than a capacity load. Some of these routes are sustaining four trucks, five of them having an operator at each end, which plan will be adopted on each route. Providing for an operator at the terminal end of each route solves the terminal and distribution problem at these route terminals and adds materially to the resources for meeting emergencies. The route terminal operated by responsible cartage or commercial warehousemen located at the terminal has solved the problem of the return load.

The Indianapolis central freight-station has been established in a section of a commercial warehouse, the operator paying out of his pocket the regular warehouse in-and-out fee of 4 cents per hundred to cover freight terminal cost. This fee of 80 cents per ton relieves the truck operator from the service of picking up his load from the shipper's platform, enables him to load his truck and to provide for economical unloading, complete freight bills for each shipment with rates, weights and classification and fees to be collected indicated. When shippers are instructed that regular schedules are maintained, shipments are sent to the terminal with the idea of securing this better service to consignee, and truck operators are enabled to keep their regular schedules.

The clearing-office and freight-soliciting department is sustained by a fee of $1.00 per ton, which is paid by the operator out of his service income. Insurance covering every possible loss to the shipper or consignee, excepting pilferage, is paid by the operator at the rate of 12 cents per $100 value.

The following rates are collected, to which is added a store-door delivery fee of 25 cents for each stop and 5 cents per hundred weight:

	1st Class.	2nd Class.	3rd Class.
1 to 5 miles.	32 cents	27½ cents	21½ cents
6 to 10 miles.	34½ cents	29½ cents	23 cents
11 to 15 miles.	35½ cents	30 cents	24 cents
16 to 20 miles.	38½ cents	33 cents	26 cents
21 to 25 miles.	40½ cents	34½ cents	27½ cents
26 to 30 miles.	42 cents	35½ cents	28 cents
31 to 35 miles.	45 cents	38 cents	30 cents
36 to 40 miles.	46 cents	39 cents	31 cents
41 to 45 miles.	48½ cents	41½ cents	32 cents
46 to 50 miles.	51 cents	43½ cents	34½ cents
51 to 55 miles.	52 cents	44 cents	35 cents
56 to 60 miles.	52½ cents	45 cents	35 cents
61 to 65 miles.	53 cents	45½ cents	35½ cents
66 to 70 miles.	54½ cents	46 cents	36½ cents
71 to 75 miles.	55½ cents	47 cents	37 cents

The plan has worked out so well that the Central Public Warehouse Company, which is now building a new commercial warehouse of 250,000 square feet capacity, has included in its building plans the floor and platform facilities for all intercity motor express trucks now operating out of Indianapolis.

Taxi and 'bus lines in the U. S. now number 37,658.

1½-Tonner Shows $4,664.06 Profit First Year

By M. C. DEE

Iron City Transfer Company, Pittsburgh

THERE are plenty of people who are always ready to engage the service of our 1¼-ton truck. We purchased this truck in April, 1920, and it has been in steady service doing general hauling work in Pittsburgh ever since. It hauls freight between the various freight depots, as well as collecting and delivering freight for manufacturers in and about the city. For instance, we have done a great deal of work for the Pennsylvania General Supply Company, hauling kegs of bolts and various mill supplies to or from any point at any time. We have also hauled thousands of gallons of oil for the Crawford Oil Company of this city. When the truck is engaged in this oil hauling work it handles 8 barrels of oil to the load, each barrel weighing between 300 to 550 pounds.

A great many of our trips take us to the suburbs, such as McKeesport and Homestead. In addition to this we very often make two or three out-of-town trips every week. We have made many trips to Erwin which is 20 miles from Pittsburgh and to East Pittsburgh which is about 15 miles from the main city.

During the freight strike we were called on to make a great many long hauls, the longest of these probably being the trip to Wheeling, West Virginia. We made this trip three times, hauling 1½ tons of office equipment each trip. This equipment was very badly needed by a large manufacturing concern in Wheeling, and it was willing to pay us a good price for the work. The round trip distance in this case is 150 miles and we covered it in 11 hours. It was high-pressure work, yet our truck built up a record for performance which includes no lay up for repairs and no delays on the road.

One of our most profitable lines of work consists in delivering newspapers from the presses to the various freight depots. We carry on this work for the Pittsburgh Dispatch. The truck starts out at 7:30 A. M. every Saturday and runs steadily until 5:30 A. M. on Sunday. During this time it makes 9 trips carrying 1½ tons each time, and travels approximately 36 miles. The low milage is due, of course, to the fact that considerable time is consumed in loading and unloading.

We have made it a special point to solicit business involving rather widely varying types of hauling. By so doing we are at no time governed by the peculiarities and limitations existing in any particular line of business. However, it would be impossible to carry out this plan successfully unless we kept our operating expenses down to an accurate figure and could adjust our rates so as to insure a profit in each case.

We have spent only $80.00 in repairs during the five-and-one-half months this truck has been in service. However, we are estimating our annual repairs at $200.00 because, of course, this item will increase as the truck grows older. We consider the $80.00 spent so far for repairs to be a very low figure in comparison to other costs prevailing in this city and based on trucks of like capacity. Pittsburgh is noted for its adverse truck operating conditions. Due to the many hills and rough coble-stone pavements, the Pittsburgh motor truck owner boasts of a closer acquaintance with repair costs than is the case in almost any other city.

Our mileage per gallon of gasolene can hardly be used as a basis of comparison. It is exceptionally low due very largely to the fact that the truck spends a large percentage of its time in the most congested portions of the down-town district, where traffic is unusually congested because of the very narrow streets. The frequent delays resulting from this congested condtion are responsible for a large idling factor in our operation of the motor.

The accompanying analysis of our operating costs shows our daily total expense to be $14.33. This means a cost of 71.65 cents per mile based on the average of 20 miles per day. It is costing us $2.12 per ton or 95.5 cents per ton-mile to carry on our present work. Even in the face of the adverse conditions under which we are operating this truck, the daily cost is not at all exorbitant. Our usual rental rate is $2.50 an hour, and we never do any job for less than $1.00. Inasmuch as many of the smaller jobs do not require over 20 minutes to half an hour it is the usual thing for the truck to earn at least $25.00 a day. Five hundred twenty dollars is figured in as this truck's share of the administrative overhead of the business. This raises the fixed charge to $2.44 a day, a sum which is included in the $14.33 of daily operating expense. Consequently our 1¼-ton Garford is producing a net profit of over $10.00 a day—a total profit of $1,590.00 for the five-and-one-half months which it has been in service. By the end of the first year this net profit will amount to $3521.10 or more than the total original cost of the truck.

On the Saturday work, which is conducted for the *Pittsburgh Dispatch*, the truck works 22 hours at a cost of $22.35. The gross weekly income is $55.00 making a profit of $32.65. This means a net profit each week on this particular job amounting to $21.98. If we figure this extra profit over a period of 52 Saturdays in the year, we have a total of $1142.96 which we can add to the first calculation, making a net total profit per year of $4,664.06.

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Laws Limiting Truck Weight Ignore Tire Section

By H. W. SLAUSON

Engineering Service Manager, Kelly-Springfield Tire Company

SEVERAL states throughout the country have adopted new measures controlling the use of the highways by motor trucks, which are giving no little concern to truck owners. After truck manufacturers, tire makers and owners had begun to look upon the 800-pound load per inch of tire width as a standard, the legislatures of several states have modified these figures until now New York restricts the load to 700 pounds per inch of tire width measured at the base, and various sections of California to figures ranging from 500 pounds to 650.

Some regulatory legislation has been necessary, it is true, because of the tendency of the truck owner to overload his vehicle to an extent that not only imposes undue strains on the roads, but wears springs, frame, axles, motor and tires. Truck and tire manufacturers, therefore, have been in sympathy with the efforts of state and county law-making bodies to restrict loads within sane limits. In their endeavor, however, to seek a remedy for the rapid destruction of roads which, in too many cases have been improperly constructed, our lawmakers have approached the subject from the wrong angle. It is true that the tire, representing as it does, the point of contact of the load with the road, should be considered as a measure of load-carrying ability, but factors other than width of base measurement enter into the carrying capacity of a tire.

A tire which cushions the truck and its load from road shocks also cushions the road from destructive impact blows, and the one may be considered as a measure of the other. The cushioning ability of a truck tire is dependent upon three factors; namely —the volume of rubber used as a cushion, the nature of the compound employed, and the means afforded for the displacement or flow of the rubber when under load. Tests made by the Bureau of Public Roads to determine the impact or hammer-blow struck by trucks traveling at various speeds, indicate conclusively that the last-named factor is of great importance and that provision for the proper absorption of the traction wave or displacement of rubber at the point of contact is a vital factor in the determination of road destructiveness.

The laws of certain states, however, ignore the type of tire and take into consideration only its measurement between the flanges of its base band. Thus, for example, a 7-inch dual solid tire will, in New York State, be permitted a load of 9,800 pounds. This 9,800 pounds will, however, under this same law, represent the maximum load which can be carried by a 14-inch single cushion tire having displacement spaces which permit of the flow of the rubber when under load and, which on the basis of actual tests by the Bureau of Public Roads, represent but 50 per cent. of the destructive effect on the road.

Anyone who wears rubber heels realizes that the cushioning effect is obtained not alone from the width of the heel but from its thickness. The entire heel might be covered by a full-sized piece of rubber only one-eighth of an inch thick, but under these conditions there would be no volume to the rubber to absorb the shock of walking. The volume or quantity of rubber, therefore, is an important factor in determining the cushioning ability of various tires. State laws, however, ignore this important factor and will permit a 6-inch tire which has been worn down to but a little more than an inch in thickness to carry a 4,200-pound load; whereas, for example, a 5-inch tire 2½ or more inches in thickness would be permitted only a 3,500-pound load on the basis of 700 pounds per inch of base width. The first tire, owing to its small height or "profile", would have but little cushioning ability for it would have but 6 square inches of cross section; whereas the second tire would have 12½ square inches of cross section, or more than twice the first, and yet the carrying capacity of the latter is restricted to nearly 17 per cent. less than that of the thin, worn-down tire of 6-inch base measurement.

Returning to the 7-inch dual tire already mentioned, which is permitted a load as great as that carried on the 14-inch single cushion tire, we find that the former will have an approximate area of cross section of 25.6 square inches. These 7-inch dual solid tires, under New York State's new law of 700 pounds per inch of width, can carry 9,800 pounds load, or about 380 pounds per inch or cross section. The 14-inch single cushion tire which, according to the present interpretation of this state law, is limited to the same carrying capacity as the low-profile dual, has an area of cross section of 39.8 square inches or 55 per cent. more than the dual. Because it is restricted to the same load, however, each square inch of its cross section is permitted to carry but 246 pounds.

Here, then, is the fallacy of the interpretation of such a state law: Volume of rubber or height, although official government tests have shown it to be a vital factor of cushioning, is entirely ignored, and in consequence thereby a solid rubber tire is allowed to carry 380 pounds per square inch of cross-section as against only 246 permitted in the case of a *cushion* tire.

The interpretation of the law in this manner is manifestly unfair, for it penalizes high-grade and long-wearing tire equipment and ignores the factors that actually determine effective cushioning. It is as impractical to determine the load-carrying capacity of tires by a single measurement of base width as it is to judge of the value of a stack of money by its weight without first determining whether this stack is composed of one dollar bills or one hundred dollar bills.

It goes without saying that it would be impossible for us to derive a like profit per dollar spent if we were using horse delivery.

Operation.

Days operated	149
Miles traveled	2,980
Miles per day	20
Miles per gallon of gasolene	2.7
Miles per gallon of oil	80

Average Cost.

Cost per day (including driver)	$ 14.33
Cost per mile	.7165
Total cost for period	2,135.15

Itemized Cost.

Driver cost per day (including above)	$ 5.45
Depreciation per mile	.0681
Maintenance and repair:	
Actual, total	80.00
Actual, per mile	.0268
Estimated, per mile	.0301
Tire cost, estimated, per mile	.0889

Discuss Road Tax Levy

Equitable distribution of taxes for road construction and maintenance, including motor vehicle license fees, and desirable restrictions of size, weight, and speed of vehicles using the roads were discussed by a committee of engineers which met in Washington, May 24, at the Bureau of Public Roads, United States Department of Agriculture. Participants in the conference represented the Association of State Highway Officials, the Bureau of Public Roads, and the automotive industry.

Taxation and restrictions are, of course, legislative matters, the bureau points out, but any agreement reached between the national and state government officials and the automotive industry will have an important bearing on legislation. The Bureau of Public Roads estimates that $600,000,000 was spent for roads in 1921, derived from the following sources: Local road bonds 33 per cent.; county, township, and district taxes, assessments, and appropriations 14 per cent.; state taxes and appropriations 12 per cent.; state road bonds 7 per cent.; motor vehicle license revenues 19 per cent.; federal-aid 14 per cent.; and miscellaneous sources 1 per cent.

Much light has been thrown upon the effect of weight, size, and speed of vehicles by recent impact tests, by observation of sections of experimental road tested to destruction by heavy traffic, and by traffic censuses which show the importance of motor transport to our commercial life. It is well established that there must be some limit to the loads which our highways are called upon to carry, says the bureau, but on the other hand the great service now rendered by motor transport and the far-reaching possibilities of the future must not be unduly lessened by viewing only one side of the question. It is very desirable, the bureau believes, that the makers of motor vehicles and the builders of roads should get together on this matter. Development of roads and motor transportation have gone hand in hand in the past, each dependent on the other, and coöperation and mutual understanding are necessary for progress in the future.

The cost of operating taxis in Budapest has increased to such an extent that the Traffic Department of the Municipal Council, in conference with the taxi company concessionaires, has established a plan to introduce during this spring a service of two-seater taxis at greatly reduced rates.

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Checking Illegal Overloading of Motor Trucks

By A. P. PORTER
Inspector, Massachusetts Department of Public Works

DURING 1920 we weighed 90 trucks by the loadometers, and last year 100 trucks by the loadometer and 400 by platform scales. The first two jacks used were calibrated to 20,000 pounds each, but the second pair, supposed to be an improved model, have a capacity of only 15,000 pounds each. The first truck I met after I began using these improved jacks was too heavy to be weighed with them, and I had to resort to a neighboring 20-ton platform scale. The rear axle of this truck weighed 33,200 pounds, the heaviest I ever weighed.

The largest gross weight of a 4-wheeled truck and load which we actually weighed was 38,300 pounds, and the largest load on 6 wheels was 40,000 pounds. The accompanying table shows the maximum loads encountered. Undoubtedly there were some larger than these which did not happen to come our way.

The proportion of the weight which comes on the rear axle of a truck varies from 70 to 87 per cent. It is not constant for a certain truck. As more load is added, the percentage on the rear increases. It varies also with different makes of truck, different classes of commodities, length of wheel-base, length of body, overhang, and how the load is placed. Loads of wood or cotton are sometimes piled forward over the cab. The average percentage on the rear, for all makes, is about 78.

The legal limit in Massachusetts for the weight of truck and load is 14 tons, and outside the metropolitan parks and sewerage districts there is also a limit of 800 pounds per inch of tire width. Since the largest tire practicable is 14 inches wide or its equivalent, two 7-inch tires, this practically limits the legal axle load to 22,400 pounds even with the largest tires. When the weight of the truck and load was over the legal limit several hundred pounds or more, we summoned the driver to court. In 1921 we had 116 cases in court and secured a verdict of guilty in 109 cases.

Sometimes we made the truckman remove part of his load. On one occasion in Reading I stopped a truck going from Boston to Lowell which weighed 38,300 pounds and another going to Lawrence which weighed 34,100 pounds. When told they could not proceed they telephoned to Boston for another truck, which came out and took 25 barrels of sugar off one truck and 17 off the other.

When we started the investigation there were three facts we wanted to determine:

1. The *Maximum Load.* The actual weight of the heaviest truck-load and how it is distributed on the wheels. This is to be used as a basis for computing the greatest stresses in the pavement and in bridges.

2. *Overloaded Trucks.* The ratio of the actual load to the manufacturers rated carrying capacity is called the "load factor." While we found some trucks carrying as much as two or three times the rated capacity, the average load factor for all the trucks carrying any load is about 1, and taking into account the trucks returning empty, the average load factor is about 0.5.

3. *Intensity of Traffic.* A highway engineer is often called upon to compare the traffic over one road with that over another. For this purpose it is necessary to stop every heavy truck passing a certain point, ask the driver a number of questions regarding the weight of his truck and load, and find the total weight of all the trucks in a given period of time. I adopted "tons-per-hour" as being probably the most convenient unit to express the volume of traffic. For instance, if one road carries ten times as many tons per hour as another, it is reasonable to suppose that the former road will wear out ten times as fast as the latter and cost ten times as much to keep up, other things being equal.

The second table herewith, showing the intensity of truck traffic, gives first the average weight in tons per hour of the commodities carried, i. e., the payload; and, secondly, the average gross weight of the trucks and loads passing that point, including the weight of the trucks returning empty. The former is an index of the relative economic value of the road to the community. The latter is a measure of the relative wear due to trucks. Pleasure vehicles and light trucks are not included in this analysis.

We divided the commodities carried into five groups: (1) Crushed stone, gravel, etc.; (2) oil, gasolene, and Tarvia in tank bodies; (3) groceries, meat and drinks; (4) wool, cotton and dry goods; (5) machinery, lumber and furniture.

MAXIMUM LOADS ENCOUNTERED.

Rated Capacity. (Tons.)	Character of Load.	Type of Body.	Actual Gross Weight. (Tons.)	Weight of Load. (Tons.)	Overall Length. (Feet.)	Wheel-Base. (Feet.)	Weight on Front Axle. (Tons.)	Weight on Rear Axle. (Tons.)
7½	Leather	Platform	22	16	24	14	5	17
7½	Crushed stone	Dump	18	11	23	14	3	15
7½	Beef	Platform	17	10.5	25	15	3.4	13.7
* 5½	Wool	Platform	22[1]	11.5[1]	45[1]	14	3[2] 4.2[3]	10.5[2] 4.3[3]
* 5	Boiler	Platform	23	14	37½[1]	15.5	3	10[2] 10[3]
....	Road-oil	Tank	16½	6½	23	14	3.3	13.2 4[4]
†...	60-foot I-beams	Special	29	16½	99	11	2[4] 2[4]	6[4] 15[5]
5½	Sugar		18¾	12½	....	13	2.1	16.6
6	Sugar	Stake	19.1	13	....	....	4	15.1
7½	Gravel	Dump	18¼	12	....	13.2	3	15¼
6½	Grapes		18¾	12½	....	....	3¾	15
‡10	Jars in ice	Enclosed	20	12	....	12.2	3	8[2] 9[3]
‡ 5	Boiler	Platform	20	10	....	15½	3	8[2] 9[3]
5	Asphalt shingles	Platform	18¼	12¼	....	15.6	4¼	14
5½	Groceries	Platform	18¼	12½	....	15.7	4¼	14
5½	Sugar	Platform	18½	13	....	12.2	3¾	14¾
Special			20	....	30	12	6	14

*For truck only in truck-trailer combination; †two tractors and semi-trailer; ‡tractor and semi-trailer; [1]includes truck and trailer; [2]truck; [3]trailer; [4]tractor. The "Special" truck is the Massachusetts standard for design of highway bridges.

Road.	Average Total Net Weight of Commodities. (Tons per hour.)	Average Total Tare Weight of Loaded and Empty Trucks. (Tons per hour.)	Average Gross Weight of Truck Traffic. (Tons per hour.)
Westfield-Springfield	80*	70	150
Boston-Lynn Traffic Road	30	80	110
Boston-Lynn Turnpike	29	77	106
Boston-Providence	30	67	97
Fall River-New Bedford	28	68	96
Boston-Woburn	29	58	87
Cambridge-Watertown	30	54	84
Boston-Lawrence	26	56	82
Boston-Taunton	22	63	85
Springfield-Holyoke	29	46	75
Boston-Marlboro	19	41	60
Boston-Natick	17	41	58
Worcester-Marlboro	16	37	53
Boston-Concord	15	33	48
Worcester-Springfield	12	36	48
Woburn-Lowell	14	32	46
Worcester-Milford	13	25	38
Lynn-Salem	12	25	37
Lowell-Lawrence	9	25	34
Framingham-Milford	8	23	31
Worcester-Athol	7	23	30
Lowell-Littleton	9	20	29
Taunton-Fall River	10	18	28
Taunton-New Bedford	8	18	26
Taunton-Milford	8	19	27
Fitchburg-Athol	8	19	27
Worcester-Sterling	6	16	22
Springfield-Pittsfield	6	16	22
Athol-Springfield	3	3	6
Athol-Greenfield	2	3	5

*Crushed stone trucks from Lane's quarry.

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City-Owned 'Bus Services in Great Britain

Recent Statistics Disclose Results Obtained in Thirty-four Cases of Municipal Motor Ownership

WHEN the history of passenger road motor transport in England comes to be written Eastbourne will become famous as being the first town in Great Britain to institute a municipal 'bus service, says a writer in *Motor Transport*. That was in 1904, when such an experiment, as it was looked upon then, by a local authority was watched with tremendous interest throughout the country. Todmorden was second in the field in 1907, and both these pioneer services have developed well, and are going strong at the present day. Up to the time of the outbreak of war, however, the motor 'bus had not achieved the same amount of popularity among local authorities as it had among private and public transport companies, so that we find that, of about 40 authorities now operating 'bus services, only a dozen were doing so in 1914.

Of course, we can not make a fair comparison between 'bus development municipally and by private enterprise, because in the former case practically all the chief towns of the country operate electric railway services, and the time of adoption of the flexible type of passenger vehicle has often been governed by the repair state of the railway system. In one or two instances —Eastbourne, for example—the town does not possess a railway system relying solely on 'buses, but in the majority of cases the 'buses have been adopted to act as feeders to existing railway routes, open up outlying suburbs and work new cross-town services not served by street-cars.

During the war one or two authorities commenced working 'buses, and on the cessation of hostilities a big development in this direction was to be observed. The advantages of the 'bus had by then come to be appreciated by the most conservative and pro-railway authorities, many of whom were faced with the problem of either investing in 'buses or spending large sums of money in track repair work and extensions.

A good indication of the extent to which motor 'bus services have been developed by local authorities is given by the table reproduced in this article, which shows figures relating to the working of practically all the municipal 'bus services in England. This table not only shows the types of vehicles employed, but also gives figures of operating costs, receipts, passengers carried, etc. In the great majority of cases the financial year ends in March, and with one or two exceptions, the figures given relate to the year 1920-21, statistics for 1921-22 not yet being available.

An examination of this table reveals some interesting points. For instance, the type of vehicles most commonly employed is the Tilling-Stevens gasolene-electric; Daimler and A. E. C. come second, and Leyland third. The city of Edinburgh has the largest fleet, this consisting of no fewer than 77 machines, which does not include 15 coaches used by the same authority on sight-seeing tours. The Edinburgh services, by the way, were not commenced until 1919, so it will be realized that the fleet has been built up very rapidly, and it is satisfactory to record that it is being run as a paying concern. Although Edinburgh has the largest fleet, it does not cover the biggest mileage, this being achieved by the Birmingham authorities with their fleet of 46 vehicles.

In comparing total operating costs and receipts per 'bus mile between the different towns, one must always bear in mind varying local conditions. Douglas, I. O. M., has both the highest costs and the highest receipts, and here, in spite of what must be a very seasonable traffic, the receipts exceed the cost. Receipts vary from 69.68 cents per mile in the case of Douglas to 23.38 cents per mile for South Shields. Total operating charges vary from 63.62 cents for Douglas to 31.38 cents for York and 32.86 cents for Aberdare. Taking averages of those figures available, we find that the cost per mile works out to 23.06 cents, and the receipts per 'bus-mile to 23.02 cents. Coventry, with a difference of 14.14 cents on the right side between costs and receipts, has the honor of having the most profitable municipal 'bus undertaking.

The Autocar Company, Ardmore, Pennsylvania, has sold through New York bankers $2,500,000 worth of first mortgage sinking-fund 7 per cent. convertible gold bonds, dated May 1, 1922, and due May 1, 1937. The bonds were offered at 100 and interest, and represent the major part of an authorized issue of $3,500,000.

Town.	Year Started.	Number of Vehicles and Seating Capacity. (Persons.)	Make.	Route Miles Worked.	Total Annual Mileage.	Receipts per 'Bus-mile. (Cents.)	Operating Costs per 'Bus-mile. (Cents.)	Passengers Carried per Year.	Average Fare per Passenger. (Cents.)	Average Fare per Mile of Journey. (Cents.)
Aberdare	1920	7—29	Tilling-Stevens	6	134,028	34.68	32.86	676,328	6.36	4.46
Aberdeen*	1921	9—32	Thornycroft	2.5	42,457	43.44	33.50	559,837	3.30	2.0
Birkenhead	1919	15—31	Leyland, Straker-Squire	18.82	308,000	52.8	.....	304,000	....	....
Birmingham	1913	46—34 and 25	Daimler, Tilling-Stevens.....	20.3	1,118,198	48.774	45.18	8,183,376	6.66	2.38
Cardiff†.....	1920	6—29	Tilling-Stevens	1.9	165,821	32.50	42.0	1,109,667	4.84	4.0
Chesterfield	1914	21—28	Daimler, Karrier, Tilling S..	25	382,789	53.84	51.54	2,424,246	5.36	3.02
Coventry	1914	11—29 and 36	A. E. C., Maudslay	9.78	220,969	52.06	57.92	2,286,017	5.02	3.42
Douglas, I. O. M.	1914	6—28	Tilling-S., Straker-Squire....	12.5	9,274	69.68	63.62	78,390	8.24	2.16
Eastbourne¶	1906	33—36, 45 and 50	Leyland	.....	509,795	48.08	48.72	5,848,030	....	....
Edinburgh	1919	77—32	Leyland, A. E. C.....	23.75	854,370	52.10	45.32	10,158,810	4.36	2.92
Halifax	1912	3—22	Daimler	3.8	56,884	49.52	56.08	569,518	4.94	3.88
Haslingden†	1920	1—22	Austin	3.9	16,217	34.80	38.58	107,313	5.26	....
Huddersfield† ...	1920	6—30, 40 and 47	Karrier	7.41	101,644	44.54	39.68	749,511	6.04	3.76
Keighley	1921	3—32	Leyland	8.5	.....	47.4	.....	.....	....	....
Lancaster	1916	5—22	Edison electric	3	58,000	24.78	37.02	498,000	2.90	1.96
Lincoln	1920	11—32	Dennis	6	173,213	43.90	54.92	1,572,661	3.0	3.32
Nottingham	1920	6—28 and 36	Dennis	9.75	.....	.....	.....	.....	....	....
Manchester	1907	13—34	Daimler, A. E. C.	8	296,048	39.02	39.24	2,201,271	5.24	3.14‖
Plymouth	1920	15—34	Straker-Squire	12.5	394,290	35.82	29.98§	2,668,348	5.28	2.72
Reading	1919	6—46	A. E. C.	10	173,642	48.08	42.50	1,353,626	6.16	2.6
Rotherham	1913	8—14 and 28	A. E. C., Daimler	20	159,319	.....	.....	.....	5.92	....
Salford	1920	8—33 and 43	Leyland	5.56	199,451	34.38	.....	1,628,948	4.20	2.62
Sheffield	1913	44—25 to 37	Daimler, A. E. C., Leyland..	62.5	.....	.....	.....	.....	....	....
Southampton† ..	1919	3—28	Thornycroft	3	91,695	39.84	41.92	734,551	4.98	2.0
South Shields ...	1914	6—22 to 30	Daimler, Thornycroft	4	73,277	23.38	.....	496,184	3.46	2.14
Todmorden	1907	15—36	Leyland	13.09	226,594	48.66	46.08	2,251,435	4.88	3.04
Wallasey	1920	10—32	A. E. C.	9.10	126,988	46.06	36.04	1,012,933	5.78	3.30
Walsall†	1915	36—28	Daimler, Stevens, Tilling-S.	50	542,445	42.90	.....	2,821,489	8.16	3.30
Warrington	1913	7—24 and 34	Tilling-Stevens	2.75	73,324	42.30	49.02	1,063,486	2.92	2.12
West Bridgford..	1914	6—46	Straker-Squire	.....	105,000	48.50	44.22	1,675,000	2.10	2.0
West Bromwich.	1914	5—26 and 32	Tilling-Stevens	9	80,135	42.8	40.12	794,128	4.56	3.2
West Hartlepool.	1921	5—32	A. E. C.	5.95	93,117	33.62	53.74	647,499	4.82	4.0
Wolverhampton‡	1911	19—24, 28 and 32	Albion, Tilling-Stevens	15.80	380,267	43.02	33.08	2,658,746	6.16	3.58
York	1915	9—24	Belsize, Edison, Railles	3.5	79,440	32.44	31.38	677,130	2.18	3.0

*Aberdeen figures relate to five months only; there are also 43.5 additional miles worked on excursions. †Figures refer to year ended March 31, 1922. ‖Since raised. §Not including capital charges. ¶Eastbourne 1920-21 figures were abnormal, and it is stated that there will be a profit of from $15,000 to $20,000 this year. ‡Total mileage does not include 14,414 miles run by 'buses on street-railway routes; operating costs are based on eleven months—April, 1921, to February, 1922.

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Traffic Grows Faster Than Roads

By THOMAS H. MacDONALD
Chief, United States Bureau of Public Roads

IN THE building of our railway systems the same individual or corporation, the same owner, owned both the rolling-stock and the roadbed. In the highway transport the individual owns the rolling-stock while the public has undertaken to provide the roadbed. It has not up to this time done a very good job.

In 1910 we were spending for all highway purposes in the United States about $120,000,000. That was largely for the horse-drawn vehicle, and its expenditure constituted pretty largely a service to the agricultural population, which at this time represents about 40 per cent. of our people. At the same time in 1910 there were only about 500,000 automobiles in the country. In the 11-year period we have increased our motor vehicle registration about 1,800 per cent. and we have increased our effective road expenditures for road purposes only about 400 per cent. Thus we have been lagging very far behind in the building of roadbeds for the rolling-stock.

In 1921 our estimate of the accumulated investment in highways for the 11-year period was $2,526,000,000 exclusive of the amount we have spent for maintenance each year. The estimate of rolling-stock value is $8,790,000,000. That is, there has been over three times as much investment in rolling-stock between 1910 and 1921 as we have expended during the same period for highway construction.

Our expenses last year for all road purposes were about $600,000,000. That includes not only the federal and state expenditures for the main state highways, but the local expenditures outside the municipalities, such as the township, county and district expenditures. And based on that total estimated cost is the estimate that it costs the American individual, each man, woman and child in the United States, about one penny per day for the highways.

Because of the large appropriation made by the Congress for federal aid, we have obtained the erroneous impression that the federal government is the backbone of the highway movement. The amount that the federal government contributed last year toward the total bill for highways was only about 14 per cent., and the portion of the cost which the motor vehicle paid in direct taxes we figure at about 19 per cent. That is, between the federal government and the motor vehicle itself we paid about 33 per cent. of our total bill. That leaves 67 per cent. to be paid from other sources, largely taxes, partially bond and partially direct.

Most of the things that we have known about highways are not so. You will find flat contradictions of practically everything we have accepted as trite and academic and almost proverbial. For example, we have had it imposed upon us almost as a commandment that thou shalt not build a road which will not last longer than the life of the bond. I think all of us will agree to that as a general proposition, but the only thing that is the matter with it, as I see it, is that it is not so.

The State of New York issued bonds for $100,000,000 and I have seen within very recent times articles written in which it is said that the roads are going to pieces so badly that they will be gone before the bonds have been paid. Probably the road surfaces built with the proceeds of those particular bonds will be gone before the bonds are paid. But it is a fact that this year in New York State we are in coöperation with the state, widening those old macadam roads with 18 feet of concrete, leaving a strip of the old macadam in the middle. This work has only just begun but is successful, making a 24-foot surfaced roadway in place of the old 12- or 14-foot macadam surface, on the same roadbed that was built with the bond money and at a cost which is enough less than the average cost of new construction of concrete 18 feet wide to absorb the first cost that the state has invested. In other words, so far as I can see it, New York State, by the investment of $100,000,000 and by building cheap roads when her needs were for cheap roads, has been having the service of those roads all these years at not to exceed the interest cost and has all the investment left. And we will have to have a marked change in the price standards that we have now reached before that fact is not so.

When one thinks of cheap roads, sand-clay roads, gravel roads, macadam roads, one should think of them in a somewhat different way from that followed in the past; one must think of them as cheap roads plus maintenance. Much of the original value in roads has disappeared simply through lack of maintenance, and as the roads are placed more and more under state supervision and systematic maintenance is given them, we find that we obtain real service from these cheaper types.

The federal legislation which was passed last year provided that federal funds shall be expended upon a definite system which shall not exceed 7 per cent. of the public road mileage within the country. That system we estimate will reach 180,000 to 190,000 miles of public highways and, when completed, it will connect practically all the county seats within each state.

There will be a gridiron of roads crossing each state, touching or connecting each county seat with the adjoining county seat, and thus interconnecting at the state borders with the roads from other states. So that it should be possible, eventually, when one gets upon a road at any point in one part of the country to go to any other county seat point in any other part of the country without leaving that particular federal-aid system of roads.

The whole question, as I see it, in regard to the federal-aid system of building roads is: Having started upon the building system, how fast are we going forward? There has been appropriated by the Congress to the states for helping to build this system of roads $340,000,000. We have placed under contract about $214,000,000 and have the remainder of it still to place under contract, $126,000,000 of which we expect from $40,000,000 to $60,000,000 to go under contract before the first of this July. That is, by the first of this July, we will not have funds sufficient to run another year unless further appropriations are made.

With ten millions of motor vehicles in this country, how long can we wait for a system of roadbeds over which to operate that rolling-stock? If we conclude that we are willing to spend from the federal treasury $50,000,000 per year, taking into consideration the 70,000 miles of road already improved, and leaving a balance of say 120,000 miles, it will take in the neighborhood of twenty years to do the job. Are we willing to wait twenty years to get a system of roads that will extend from county seat to county seat only, not all paved roads by any means?

If we conclude that we can spend $75,000,000 per year from the federal treasury we can do this job, assuming that we can still impose on the states as we have been doing in the past, when under a law that says we can pay 50 per cent. of the cost we have been getting along with paying 42 per cent., the states paying the remainder because they were in a bigger hurry than the federal government—if we conclude we can pay $75,000,000 per year it will take us fifteen years. If we conclude that we can afford $100,000,000 a year we can do the job in ten years. That is the fact that has to be decided by the Congress and by the people in the United States who are going to use ten million motor vehicles this year, whether they are willing to wait ten or fifteen or twenty years for a system of improved roads.

THIS system of improved roads, as I say, will not all be paved roads. The mileage which has been built, up to the present time, through the state and federal funds has been about 70 per cent. of the cheaper types. But the reverse is true as to the cost. The 30 per cent., or the modern paved roads which are being built, will cost in the neighborhood of 62 per cent. of the total fund. So that the larger mileage is costing only about 38 per cent. But we must take into consideration that is very many parts of the United States the cheaper forms of highway will serve adequately, if maintained, and it is a requirement of the federal law that, if the states are to secure continued federal appropriations, they must undertake, as states, the maintenance of the hihgways and must put the federal-aid system under patrol. Which means that someone is responsible for every mile of high-

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ways within that system every day in the year.

The lack of such a system is the reason that we have not received service from our highways in the past. We have never been able to impose a sufficient sense of responsibility upon the local communities, the local officials, such as the county board of supervisors, to secure maintenance of the highways.

There is a distinct line between the state and the county authority. The county authorities, except in very rare instances, have never maintained their roads. They have never been willing to put a man on a stretch of road and keep him there and give him responsibility and make it his job to take care of that particular piece of road. With such maintenance as is required by the Federal Highway Act we are going to be able to get adequate service out of the cheaper forms of roads. So estimates based on what has been done in the past are reasonably accurate, and the job can be done in twenty years at an expenditure of $50,000,000 per year or in ten years with an expenditure of $100,000,000 from the federal treasury.

Now that would perhaps require us to raise more of the money from transportation, not as a tax, however, on transportation. If our estimates as to the investment in motor vehicles are somewhat near right at $8,790,000,000, a 20 per cent. depreciation of these motor vehicles is over $1,600,000,000 per year. I do not know how much of that depreciation we can prevent by improving the roads, but if we can cut the bill for repairs by $600,000,000 that would be enough to pay our total road bill for last year. We don't imagine that by better roads we can save the total depreciation on the motor vehicle and I do not know just exactly how we are going to arrive at a fair division between the roadbed and the motor vehicle of the profits from transportation.

WE are approaching this from rather difficult angles, because the individual owns the rolling-stock and the public owns the roads, and I don't know how we are going to get the individual to sit on one side of the owner and on the other side of the case as a part of the public who owns the rolling-stock and divide fairly the profits due to highway transportation, which is made up of the motor vehicle on one hand and the improved road on the other hand. But in some way or other we must divide the profits that accrue from this transportation between the roadbed and the machine.

We have been making a study recently of the uses which the motor vehicle makes of the Connecticut highway. We found, for example, that the Boston Post Road was carrying eggs for an average haul of 68 miles. We found an average haul of all commodities on that road something like 70 miles. That one road was carrying commodities figured at an annual value of at least $15,000,000. The division was approximately only 14 per cent. to agricultural products and about 73 per cent. to the manufactured products.

Strange as it may seem, the heavier commodities hauled around the streets on motor trucks, such as coal, sand, gravel and materials of that character, are not the commodities we find are hauled over the public highways. The commodities that go to the public highway on the long-distance haul are the higher-priced, smaller bulk commodities in which time is an element. So that we find that predominating in the commodities that are hauled, not the heavy classes of commodities which go to the railroads, such as coal, ores, gravel and stone, but to lighter and more expensive commodities—butter, for example.

We find on that one highway 73,000 ton-miles of butter hauled annually. The haulage of eggs amounted to 79,000, of fruit to 161,000 ton-miles. That means that New York was sending up into that district, or that that district was sending down to New York, commodities such as we have on our tables fresh every day, butter, eggs, fruit, all commodities in which time is an element. I think we all agree that with eggs, at least, time is an element.

This census will be continued this summer until we are able to deny, I am positive, the fact that the railroad and the automobile and truck are competitors. That is, except with a very small margin. I do believe that the automobile and the truck will come in to add to the sum total of our transportation and that it will become an ally of the railroad in a greater degree than a competitor.

To develop our present views with regard to these things has taken a great deal of research, and we are engaged now in studying on a very elaborate scale all the elements which go to make up the physical characteristics of the highways, the higway surfaces and the higway supports on the subgrades under them. In that work we have enlisted in a national highway research program as many of the colleges and universities as we can persuade to join. We are putting to work the engineering research plants and testing plants which have been developed at the universities and colleges, and that work is being conducted in all parts of the United States, not only on the higher-priced roads, but down through the South; for example, in North Carolina and South Carolina, upon the sand-clay, the gravel and the top-soil roads.

In California—and here is another thing that is not so—people say that the roads have gone to pieces and that they have been gradually "giving up the ghost." The bureau made a very careful survey of 1,290 miles out of the entire system of about 1,500 miles of concrete roads which have been built in California since 1909; that is a period of over ten years. In that 10-year period of the entire mileage that has been built, less than 13 per cent. is all that shows signs of distress or that has been broken down. And those roads were four and five inches thick and 70 per cent. of all which showed distress were laid over clay and adobe soils. It is my judgment that they would have shown about the same distress when laid over that kind of soil had they been very much thicker.

It is not so much a matter of the vehicles that are going over our highways as it is the character of material which lies under our highways that is causing us concern. As a matter of fact, cracks in concrete roads very frequently mean that the concrete road has lifted free from the subgrade which lies under it and is supposed to support it, due to the warping action of the sun. On a hot day the monolithic road slabs curl downward at the edges so that their centers are lifted clear off the subgrade. A heavy motor vehicle running over the road at such a time may be supported by a thin wedge of air in place of the subgrade itself.

THOSE things are facts as they have been developed. It is not going to be increasingly difficult to carry the traffic over the highways. It is going to be increasingly easy, if we study out the scientific principles which we must know and apply in order to carry heavy loads upon soils such as we have and which vary from place to place in the United States.

If we were building all highways over good gravel or over good sand subgrades, we would not need to worry about how heavy the motor vehicles become, because all we would need would be a thin slab on top to take care of the wear under the wheels and the subgrade would do the rest. But where we have a subgrade that becomes so soft that it squashes out from under our road every time it gets wet, and every time it gets dry shrinks away from it and does not hold it up so that the slabs are not supported by anything whatever, it is not to be wondered that the road cracks.

It seems to me that, in this matter of highway transport, the main thing is to judge its development by the facts and not by current gossip that obtains or prevails relative to instances where the highway may have failed. I want to contradict one other thing. I want to contradict the oft-heard remark that our highways are going to pieces now.

During the period of the war practically all maintenance was withdrawn from the highways at the period when we increased our rolling-stock over them more than 1,200 per cent. It has taken the whole time since the war period to bring those highways back. Take, for example, conditions as they exist in the State of Massachusetts. This year they have expended what they figure would be the equivalent of about three years' normal maintenance money on the highways. But with that expenditure they feel that they have brought their highways back not only to as good condition as they were in before the war, but to a far better condition, and that is generally the condition of the highways as we find them—that they are in better condition to-day than they have ever been before, notwithstanding our rolling-stock over them has increased more than 1,800 per cent.

Canadian Exports

The exports of Canadian motor vehicles for the fiscal year ending March 31, 1922, numbered 14,724, valued at $8,032,804, while automobile parts were valued at $1,151,453. This compares with a total of 15,620 passenger-cars, valued at $11,376,278, and 4,286 motor trucks, valued at $2,499,103, shipped during the twelve months from March 31, 1920, to March 31, 1921. The value of the parts shipments during the same period were $4,262,325.

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Bethlehem Motors Revived

A reorganization meeting of the Bethlehem Motors Corporation was held on Thursday, May 4, at the office of Wing & Russell, attorneys, 14 Wall street, New York City. After the meeting the attorneys gave out the following statement:

"The Bethlehem Motors Corporation, the organization meeting of which was held in our office today, has taken over the property, inventory, etc., recently purchased by Howard B. Hall at the receivers' sale of the old Bethlehem Motors Corporation. Mr. Hall acted for a group which, besides himself, included the First National Bank of Boston and Arthur T. Murray. There are no other interests either directly or indirectly associated with Mr. Hall other than those named above. The company intends as soon as practical to enter the truck manufacturing field in a substantial way."

The officers of the new company are:—A. T. Murray, chairman of board; Howard B. Hall, president; E. H. Leland, vice-president and treasurer; W. H. Rodgers, secretary and assistant treasurer: The directorate is as follows: Clifton H. Dwinell, Boston; Howard B. Hall, New York City; E. H. Leland, Boston; W. H. Rodgers, Allentown, Pa.; A. T. Murray, Springfield, Mass.; Richard Bennett, Jr., New York City; Peter J. Brennan, New York City.

It will be recalled that the old Bethlehem Motors Corporation was organized in the latter part of 1916, and one of the associates that Mr. Murray—who was president and one of the organizers of the company—gathered around him was Mr. Hall. Mr. Hall subsequently became vice-president of the old company.. The record of the company under the original management was a very enviable one. During the period from January 1, 1917, to July 1, 1919, the company produced approximately 6,000 trucks, which is probably a record that has seldom been equalled in the industry from a standpoint of production of a new company.

About July, 1919, a syndicate of bankers purchased the Bethlehem Motors Corporation and the North American Motors of Pottstown. At that time Mr. Murray severed all active connection with the operation of the business, it being essential that he devote all his time to the direction of the affairs of the American Bosch Magneto Corporation. Mr. Hall continued as vice-president until some time in the fall of 1919, but could not work in harmony with the new interests, with the result that he resigned. Mr. Hall was largely responsible for the success of the company under its original management and there is every reason to suppose that under his guidance the new company will follow the same path that it followed during the first two and a half years of its existence, during which time it was a very substantial factor in the industry.

The new company will produce three models at present: a 1-tonner, to be known as model KN and to sell at $1,195, for the chassis; a 2-tonner, to be known as model GN and to sell for $1,595 for the chassis; a 3-tonner, model HN, priced at $2,195 for the chassis. The first machine is bevel-gear driven, the others by internal-gear axles.

New Master 'Bus

The most recent development in passenger-carrying vehicles is the Master coach, a product of Master Trucks, Inc., Chicago. The new vehicle is designed especially with the idea of obtaining the greatest stability and the highest degree of safety for the passengers. By underslinging the springs and by building a frame with a decided kick-up in the rear it has been possible to maintain a low center of gravity and permit easy entrance, the floor of which is only 26 inches above the ground.

The Master Company is now in production on the model JDB chassis capable of carrying 22 passengers, but it is planned to furnish a similar chassis to accommodate 26, 30 and 34 passengers. The wheel-base of the model JDB is 170 inches. The body space measures 192 inches in length, 75 inches in height and 84 inches in width, overhanging the frame only 1 inch.

The frame is constructed from ¼-inch pressed-steel with all spring-hangers and cross-members hot riveted. The channel section is 5⅝ inches deep, has a 3¼-inch flange and 6 cross-members reinforced by gusset plates. In addition there are three body-supporting arms on each side of the frame and a rear cross-member extending outward to 70 inches width over all, forming a substantial foundation for the body.

The engine used is a four-cylinder 3¾ inch x 5¼ inch Buda, with removable head, designed especially for 'bus service. It is equipped with magneto ignition, 6-volt electric lighting system, a 140 ampere-hour battery and generator.

Other specifications include a Fuller 3-speed gearset and clutch, Walker rear axle, cushion wheels, and solid tires 34 by 4 inches in front and 36 by 4 inches in back.

The company is prepared to furnish a body which has been designed to insure the comfort and favor of the passenger. The seats are constructed from rattan mounted on steel pedestals and are 32 inches wide with a handhold. The body is completely ceiled inside, white-enameled, has 3 dome-lights attached to the ceiling and 14 "sanitary" type strap-hangers, metal advertising racks extending the full length on both sides. The wood sashes are equipped with rubber strips, safety catches and anti-rattlers. Pullman-style curtains are used and a buzzer and flash push-button are located between the windows. The aisles are covered with ¼-inch slush strips. There is also an exhaust-heater. Grab-handles are affixed at the front entrance, red and green lights are mounted on the front corners of the body, and there is an automatically controlled entrance light. Three guard-rails on the outside of the lower windows on each side insure arm and head protection. Three adjustable ventilators are also provided. A reflector mirror is mounted in front of the operator and a partition in back of the operator's seat with spring roll-up curtains protects him in daytime from talkative passengers and after dark from the interior light which endangers driving. Four signs reading "Safety First, "No Spitting," "Pay Enter" and "No Talking to Operator" complete the body equipment.

Seasoned white oak and ash are used throughout with the exception of the floor which is made from long-leaf yellow pine tongue-and-grooved flooring. The outside panels are constructed from plymetal, heavily ironed throughout. The windows are double strength glass; windshield crystal sheet glass ventilating type, giving clear vision. The front door is controlled from the operator's seat and the emergency door at rear is locked from the inside.

Traffic Will Pay for Road

Truck owners may play a more important role in the building of a proposed 30-mile highway in Connecticut exclusively for their use than was at first supposed. There has now been disclosed by the state highway department a plan evolved for presentation to the legislature whereby the truck owner will pay for the pleasure and profit he obtains from having the whole road on which to steer his heavily ladened vehicles.

By the assessment of a tax of 2 cents a ton-mile against each freight-carrying truck passing over the highway, the plan contemplates the raising of about $280,000 a year until the cost of the project has been liquidated. Whether the money would be collected in toll charges, as such charges are taken up on Connecticut toll bridges, is a detail which is left for development pending the action of the legislature and an opinion as to the legality of the plan. It is estimated that the present road carries loads valued at $12,210,000 each year. If the ultimate cost of the new highway should reach $2,500,000, is is felt that the cost, plus interest in the event of a loan, could be covered by the 2-cents-a-ton-mile charge in about 20 years at the present rate of traffic.

National Discounts for Fleet Owners

The Chadwick, Delamater Corporation of New York, representative of the makers of Continental motors, Timken and Sheldon axles, Pierce governors, Warner gears, and "Hy-Duty" fans in the servicing of parts made by them, has inaugurated a policy of giving owners of fleets of trucks embodying such units the benefit of a scale of discounts running up to 15 and 20 per cent. The new arrangement applies to both national and local accounts. Although the complete plan has not been fully worked out, it is likely that the amount of the discount granted in each case will be governed by the number of trucks in the fleet. It is thought that the plan begun in New York is but the beginning of a national scheme to be followed in all other cities where the parts makers system of "specialized" vehicles parts service stations has been or will be established.

Motor organizations in Massachusetts fighting legislation in Boston won a sweeping victory when the lower branch of the legislature killed the proposed 1-cent-a-gallon tax on gasolene and 100 per cent. increase in truck fees.

Motors trucks handled about 1,200,000,000 pounds of freight during 1921.

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China as a Market for Motor Products

By GORDON LEE

Chief, Automotive Division, Bureau of Foreign and Domestic Commerce

AMERICAN firms in Shanghai, Tientsin and Peking deserve much credit for their pioneer work in selling motor cars and trucks. In accomplishing cross-country journeys where there are no paths, motor vehicles of American make have shown what they can do and have awakened the Chinese to the need of highways. The lack of modern roads accounts for the fact that, although motor vehicles have been sold in China for 20 years, only a small number of them are now in operation and the market is still very limited. Recent estimates place the mileage of the improved city streets and roads of China at 500 and the passable dirt roads in the rural districts at 1,200. The number of cars, motor trucks and 'buses in operation probably does not greatly exceed 8,000.

Aside from the lack of roads, the cost of fuel is of importance. The price of gasolene varies from 40 to 60 cents per gallon in Shanghai to $60 or more in Urga, Mongolia, the price increasing in proportion to the distance from the treaty ports and the correspondingly heavy expense for inland transportation. Urga receives its supply of gasolene by camel trains across the Mongolian Plateau, the fuel being too bulky for transport by the existing motor lines, which make the distance in one-eighth of the time required by caravans. American and other foreign oil companies have already built up extensive distributing organizations in China, and with extension of roads these can easily add to their sales of fuel oils and lubricants.

Regarded at first as a luxury, the motor vehicle is now recognized in China as a necessity for rapid transit in cities, for suburban and interurban communications, for connecting railways with waterways, for feeder lines to railways and water routes, and for temporary use on the graded right of way of railroad extensions before ties and rails are laid.

Road conditions away from the urban districts constitute severe tests on motor vehicles, and only the most substantial machines can stand them. Peking's frequent dust storms and cold winters make closed vehicles popular. Machines with a short wheelbase and with gears permitting easy change from medium to low speed are best adapted to the city streets, which are narrow and used by a great number and variety of native vehicles. The Chinese are skilled chauffeurs and excellent judges of distance, but because they do not pay adequate attention to the up-keep of their vehicles it is essential to make the mechanism as simple as possible.

Rickshaws—two-wheeled man-drawn, one-passenger vehicles—are widely used in China. For any but very short distances, however, they are expensive, as shown by a comparison of rates in Nantungchow; Over a route of 8 miles from the town to the Yangtse River the motor 'bus fare is 15 cents and the rickshaw fare 30 cents (normal exchange)—provided the passenger can persuade the runner to accept it, 10 or 20 cents more often being demanded. The 20-passenger motor 'bus seems to be the most popular type for suburban and interurban transportation.

Taxicabs are gaining favor in Shanghai and Peking, which cover extensive areas and lack other facilities for rapid transit. Many companies, both Chinese and foreign, operate hire cars in these cities. Shanghai street-car lines serve the business section fairly well, but do not cover the outlying districts. The taxicab rates in Shanghai vary from $1.50 to $2.50 (normal exchange) per hour. Arrangements can be made by the month for a specified number of trips daily.

A few motor trucks are employed in Shanghai for general hauling purposes. Among the uses are shipping and forwarding agents, flour mills, lumber companies, publishing houses, the Chinese post-office, and the municipal electricity department. Both the international settlement and the French concession have motor fire-fighting equipment.

In order to develop a larger volume of business in China, American manufacturers, working closely with experienced representatives there, should consider the following points:

(1) The good-roads idea will not be thoroughly sold in China until the Chinese can be induced to maintain their roads in good condition.

(2) Chinese promoters of motor transport services lack practical experience. Experts should be assigned by American manufacturers to work with and advise them; they will ge glad to have this American assistance. Frequently the promoters of motor 'bus lines want American manufacturers to finance them. This is often inadvisable, as conditions in China are radically different from those in the United States, where definite laws are in force and police protection is afforded. If American manufacturers can sell the idea of motor transportation to responsible Chinese officials and merchants, heavy financing will be unnecessary.

(3) The importance of Chinese chambers of commerce in sales campaigns for motor equipment should be noted. It is stated that their number exceeds 800, with a total enrollment of nearly 250,000 firms. They differ from our commercial organizations, being quasi-governmental bodies that hold charters from the Ministry of Agriculture and Commerce in Peking. They are interested in trade development and eager to learn of commercial possibilities of any kind. In their membership is included by far the largest class of native business men worthy of consideration as prospective buyers of motor cars.

Before the war European manufaeturers—British, German, Belgian, and French—were selling to China annually about twice as many motor vehicles as American manufacturers. During the war the latter obtained more than 90 per cent. of this business, and it is believed that three-fourths of the motor vehicles in use in China to-day came from the United States. Although European competitors have now returned to the field, American machines have made such a record—many of the standard makes being represented by active agents who maintain service stations—that they are likely to retain most of their share of the trade.

American vehicles are handled by American representatives, British and French importers, and by several Chinese firms in Shanghai. Their showrooms are conspicuous along the principal thoroughfares. American tires and accessories are sold by many garages, as well as by motor-car importers and dealers. British and Continental manufacturers compete for the tire business.

Although there are now 13 plants building motor-car bodies in Shanghai and one concern which has manufactured a complete machine, there is little probability that China will develop a motor-vehicle manufacturing industry.

The outlook for motor vehicle sales in China was greatly improved at the end of 1921, when the Shanghai Automobile Show drew 25,000 visitors and resulted in $120,000 worth of business. Early in that year about 700 cars and 50 or more motor trucks, ordered in the high-silver period of 1919-20, were lying on the docks at Shanghai, as were many more at other oriental ports. By midsummer this equipment had been fairly well cleared and new orders were going to the United States. So marked was the improvement by autumn that one American firm in Shanghai reported more sales of machines in October than during any one month for two years.

Municipal Motors in England

Interesting statistics covering the use of motor trucks, 'buses and cycles by the municipal authorities of Great Britain have recently been published. They indicate a total of 5,250 motor vehicles employed in the various branches of municipal hauling and passenger transport. Approximately correct figures for the different classes of work follow:

Class of Work.	Type of Vehicle— Electric	Gasolene	Steam.
General haulage (all miscellaneous work done by trucks of 1½-ton or more capacity)	160	765	520
Refuse collection	450	320	65
Light hauling (trucks under 1½-ton rating and passenger - cars for officials, etc.)	...	720	..
Fire protection	...	575	..
Passenger service (motor 'buses)	15	565	..
Ambulance service	...	570	..
Street-cleaning	15	230	..
Inspection, policing, etc. (motorcycles only)	...	150	..
Miscellaneous (road - rollers, tower - wagons, and other special vehicles)	5	115	10
Totals	645	4,010	595

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Boiler-Maker's Truck Never Misses a Day

By J. A. KAVANAGH

Manager, Wallace Stebbins & Sons, Baltimore

THE firm of Wallace Stebbins & Sons has been in business in Baltimore for 50 years. We handle machinery and supplies of various kinds, including pipe-fittings, valves, and other equipment for stationary power-plants. We are also steam-fitters, machinists and boiler-makers, specializing in alterations, additions, and repairs. Practically every one in and around Baltimore knows us, and we usually get the first chance to bid on an alteration or repair job.

This work is done for concerns of various kinds, including office buildings and factories, mills, shipyards, and stationary power-plants. A great many of our customers have large machines which require repairs at rare intervals. For this reason they can not afford to keep on hand the skilled mechanics and special tools required for these occasional jobs. Besides we can do the work more satisfactorily and more quickly, because we specialize in such work and have all the necessary tools and mechanics for doing it.

Prior to 1918, all our hauling was done by team, but at that time we decided to buy a motor truck. This was during the war when trucks were hard to get, so we bought a common light 1-ton truck for use until we had time to find out exactly what kind of a truck we wanted.

In May, 1920, we purchased a 1½-ton Selden. While we do have loads of 1½ and 2 tons, most of our loads are only a few hundred pounds, so that it wouldn't pay to have a heavy truck. When the loads weigh around 5 tons, it is cheaper to hire them hauled.

This truck goes to our customers all over Baltimore and vicinity, and brings small machines back to the shop for repairs. After repairs have been made, it hauls the machinery back to the customer. About half of our work is done outside our shop, on machines that are too large to move. In such cases the truck takes the necessary tools and workmen to and from the job. It often carries as many as 10 men, but 2 or 3 is the usual number.

The record of the truck is kept on the standard cost system, which shows that, for the 11 months ending June 1, 1921, it operated 280 days, made 1,902 deliveries or pick-up stops, and traveled 7,566 miles. It hauled 817,239 pounds out and 499,425 pounds into the plant, making a total of 1,316,664 pounds hauled in the 11 months. It was not laid up a single day.

Being experts at keeping machinery in repair, we figure that we shall be able to run the truck for 5 years, and are depreciating it on this basis. Actual repairs to date have been only about $20.00 and repair and maintenance should not exceed $350.00 a year. This may seem high for a 1½-ton truck, but we keep the truck like a passenger-car. At frequent intervals it is painted with the best quality paint, so that it serves as a good advertisement of our business.

The Selden costs $12.42 a day with driver, 26 cents per hundredweight, and 8 cents per hundredweight-mile. These are very reasonable costs, considering that the nature of the loads makes them slow to handle, and that the average load does not exceed 1,100 pounds. On the other hand we have to have a 1½-ton truck to handle the 1½- and 2-ton loads which we are getting regularly.

On one occasion the truck made a 100-mile round trip to Cheltenham, Maryland, where we were erecting a steel stack. The stack had been shipped by freight and was already for erecting, but a 58-foot pole was required. As we wanted it on the ground in a hurry, we shipped it on the truck. The pole did not weigh over ¾ ton, but it was very bulky and hard to handle. The round trip was made in 12 hours without any operating difficulties. The costs were:

Variable expense (100 miles at 23.81 cents)	$23.81
Fixed expense (1 day)	2.07
Driver's wage (1 day)	3.91
Total expense of trip	$29.79

Hauling only ¾ ton the cost was $39.18 per ton and 78.35 cents per ton-mile. While these costs would be cut in two by a capacity load, the object of this trip was to get the pole on the job as needed.

The nature of our business makes speedy delivery service very important. When our services are required, it usually means that some important machine is laid up and must be fixed in a hurry because it is holding up production. This requires not only a fast truck, but a dependable one. Of course the truck is much faster than horses, though a team has some advantages at a crowded freight-yard. As compared with our former light truck, the 1½-tonner can carry a heavier load, has greater advertising value, and is laid up less for repairs.

The adoption of motor trucks has brought us a material increase in business, though just what percentage we can not say. Some of this increased business is probably due to the fact that we are now making deliveries free of charge, whereas we used to charge the customer for them. We feel that our present policy is by far the better in the long run, and that our truck enables us to guarantee service as promised.

Performance.

Period covered	11 months
Days operated	280
Total round trips	1,195
Deliveries—pick-ups	1,902
Loads out (cwt.)	8,172.39
Loads in (cwt.)	4,994.25
Total loads (cwt.)	13,166.64
Miles traveled	7,566
Gasolene used (gallons)	1,162
Cylinder oil used (gallons)	40¾
Round trips per day	4
Deliveries—pick-ups per day	7
Loads out (cwt.) per day	29.18
Loads in (cwt.) per day	17.84
Total loads (cwt.) per day	47.02
Miles traveled per day	27
Miles per round trip	6.7
Loads per trip both ways (cwt.)	11.75
Cwt.-miles	158.87
Miles per gallon gasolene	6.5
Miles per gallon oil	185
Investments:	
Chassis, etc., complete	$4,415.27
Tire value	439.90
Total less tires (to be depreciated)	$3,975.37

Fixed Charges—Yearly.

Interest on total investment @ 7%.	$ 309.07
Taxes and licenses	15.00
Insurance	92.00
Garage expenses	216.00
Total per annum	$ 632.07
Total per month (per day $2.07)	52.67
Total for period, 11 months	579.37

Variable Charges—Period.

Fuel at 32 cents gallon	$ 371.84
Cylinder-oil at 60 cents gallon	24.52
Tires—7,566 miles ($439.90 ÷ 10,000 miles life)	332.96
Depreciation—7,566 miles ($3,975.37 ÷ 40,000 miles life)	752.06
Maintenance and repairs(estimated)	320.83
Total variable charges	$1,802.15
Driver's wages	1,096.00
Total fixed charges	579.37
Total operating cost	$3,477.52
Cost per day operated	$12.42
Cost per mile traveled	.46
Cost per cwt. hauled	.26
Cost per cwt.—mile	.08
Repair cost per mile—estimated	.042
Repair cost per mile—actual	.002

Motor Exports Sixth Largest

The tonnage outgo of food products from New York was larger in March than February. Sugar and flour exports together increased $5,000,000. Gains over February were general, carrying total March domestice exports up to $127,000,000, an increase of $35,000,000.

Seasonal demand for refined copper, cotton manufactures and many steel products was much better than a year ago. Mineral oil exports were only three-fifths as large as in March, 1921, but recorded a substantial advance over February, 1922. Automobile exports increased a fourth over both of the earlier months, with the greatest improvement in tires.

Following are leading the New York exports for March and February, 1922, and March, 1921:

	1922		March,
	March.	February.	1921.
Automobiles	$1,989,040	$1,608,386	$1,314,874
Automobile parts	1,556,277	1,107,439	1,805,081
Automobile tires	1,674,345	870,663	521,977
Copper, refined.	6,885,382	4,948,988	2,884,496
Cotton manufactures	7,094,547	5,508,459	5,827,219
Beef, all kinds.	312,600	249,564	364,941
Engines, gas	422,201	243,158	620,073
Engines, steam.	69,496	115,574	4,401,426
Footwear	485,922	536,107	2,375,243
Galvanized iron.	733,441	690,764	836,869
Hog meat	3,166,459	5,433,108	6,502,912
Lard	5,754,370	6,442,197	8,588,702
Condensed milk.	354,066	618,750	1,465,061
Metal working machines	527,461	322,286	1,943,081
Mineral oil	9,748,750	8,102,170	15,759,037
Shoe leather	1,866,029	2,077,901	1,395,577
Steel, sheets and plates	1,801,143	1,017,070	1,298,323
Steel, bars and billets	373,247	347,392	750,020
Sugar	6,967,778	3,577,094	1,031,800
Tinplate	397,668	408,085	5,474,270
Wheat flour	4,811,928	2,750,698	5,634,547
Wire	1,761,121	895,614	1,265,167

Automotive exports held sixth place in March, seventh place in February, and eighth place in March, 1921.

The market for motor cars is limited in Latvia at present, although there is a small demand for the cheaper makes of motor trucks. Germany is the chief competitor in the market, and German goods are favored to a considerable extent. Long-time credits are the most common form of payment.

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5-Year-Old 3½-Tonner's Repairs Cost 3 Cents a Mile

By HARRY J. RAE

Superintendent, F. B. Rae Oil Company, Rochester, New York

IN THE LAST 5 years our 3½-ton Selden tank truck has hauled over 3,500,000 gallons of gasolene, which would drive the truck over 15,000,000 miles, or more than 600 times around the earth, actually traveling 36,975 miles. We are manufacturers and wholesalers of oils and greases, which we sell to garages and four filling stations of our own. We are one of the biggest independent oil companies in Rochester. In addition to the two Seldens, we operate two other tank trucks, besides several trucks that deliver oil in barrels, cans, etc. We also use a 1-horse rig.

The 3½-tonner is equipped with a 1,242-gallon tank body, and the 5-tonner has a 1,562-gallon tank. Each truck makes daily deliveries to garages and filling stations in Rochester and vicinity, covering the territory within a 7-mile radius. The roads are good and there are no hills. The older truck averages 2 loads of gasolene a day and 15 stops; the 5-tonner averages 3 loads and 10 stops. The stops are rather few because two of the stations take big orders that use up a considerable part of a load. The 3½ tonner has the longer route, averaging 25 miles a day; the other works on short heavy loads, averaging slightly over 18 miles a day.

Horses are too slow for most of our work. It takes a half day to make a 14-mile round trip with a horse, but it can be done with the truck in 1½ to 2 hours. Usually when the filling stations or garages call up and order gasolene, they want it at once. The quick delivery furnished by our trucks has resulted in satisfied customers and considerable increase in our business.

In 5 years the 3½-ton truck has cost only about $600 for repairs in addition to about 5 per cent. of the time of one man, making a total repair cost for the period of $1,120, or only about 3 cents a mile. The 5-ton vehicle has operated for an actual repair cost of only $15 for 16 months. It has not lost a day for repairs, and the older truck has lost only two months.

Briefly our costs are as follows:

Cost of Average Day—	3½-Ton.	5-Ton.
Fixed charges	$ 6.65	$ 7.03
Variable charges	5.05	6.44
Total cost per day	$11.70	$13.47
Cost per mile	46.8c	73.6c
Cost per gallon	0.4	0.3
Cost per gallon-mile	0.08	0.1

Detailed costs are shown in the accompanying tables.

Mexico Favors Motor Transport

"The business man in Mexico, as in the United States, has come to feel that the motor vehicle is a necessity." This statement by the official organ of the American Chamber of Commerce in Mexico City appears to be in line with the policy of the Mexican Government, which, for quite some time has regarded the motor truck as prerequisite to proper development of the country's resources.

This appreciation of the machine's utility is emphasized by the suspension, through presidential decree, of import duties, despite the general need for revenue. Similarly, governors in certain provinces have urged that the taxes on motor vehicles be kept low.

Even in matters of organizing of automobile shows and fostering of highway projects official interest has been taken. As a result, several shows have already been held in Mexico City and a national highway proposed to traverse the entire country.

Imports of American motor vehicles into Mexico, consisting of 6,750 cars and 1,482 trucks, showed an increase in 1921 compared with the preceding year. Shipments may be expected to be even greater this year as motors, in view of the government attitude, are sure to contribute considerably toward developing outlying sections. Already mining companies and oil operators, who have constructed roads between their properties and railroads, are gradually replacing ox-teams with trucks.

ANALYSIS OF THE PERFORMANCE AND OPERATING COST OF A 5-TON TRUCK IN THE SERVICE OF THE F. B. RAE OIL COMPANY, ROCHESTER, NEW YORK, FOR SIXTEEN MONTHS.

Performance.

Days in operation during period	408
Round trips made during period	1,224
Deliveries and pick-ups made during period	4,080
Gallons carried during period	1,911,888
Miles traveled during period	7,486
Gallons of fuel used during period	2,170
Gallons of oil used during period	32
Average number of round trips daily	3
Average number of deliveries and pick-ups daily	10
Average number of gallons carried daily	4,686
Average number of miles traveled daily	18.35
Average number of miles in round trip	6.11
Average number of gallons carried per trip	1,562
Average number of miles traveled per gallon of fuel	3.4
Average number of miles traveled per gallon of oil	234

Cost.

	For the Period.	Per Mile
Fixed Expense:		
Interest on $8,200.00 @ 6%	$ 369.00	
Taxes and licenses	73.33	
Insurance	247.33	
Garage	240.00	
Driver's wages @ $4.76 per day	1,941.33	
Total fixed expense	$2,870.99	38.3c
Variable Expense:		
Depreciation, based on $7,783.80 ($8,200.00 less $416.20 for tires) over estimated 45,000-mile life	$1,295.08	17.3c
Maintenance and repair, estimated at	400.00	5.3
Tires, based on $416.20 over estimated 8,000-mile life	389.27	5.1
Fuel, 2,170 gallons gasolene @ 25c	542.50	7.2
Oil, 32 gallons @ 50c	16.00	0.2
Total variable expense	$2,642.85	35.1c
Total cost	$5,513.84	73.4c
Cost per day, 18.35 miles @ 73.4c	$13.47	
Cost per gallon	0.0028	
Cost per gallon-mile	0.0009	

ANALYSIS OF THE PERFORMANCE AND OPERATING COST OF A 3½-TON TRUCK IN THE SERVICE OF THE F. B. RAE OIL COMPANY, ROCHESTER, NEW YORK, FOR FIVE YEARS.

Performance.

Days in operation during period	1,479
Round trips made during period	2,958
Deliveries and pick-ups made during period	22,185
Gallons carried during period	3,673,836
Miles traveled during period	36,975
Gallons of fuel used during period	8,868
Gallons of oil used during period	240
Average number of round trips daily	2
Average number of deliveries and pick-ups daily	15
Average number of gallons carried daily	2,484
Average number of miles traveled daily	25
Average number of miles in round trip	12.5
Average number of gallons carried per trip	1,242
Average number of miles traveled per gallon of fuel	4.22
Average number of miles traveled per gallon of oil	154

Cost.

	For the Period.	Per Mile
Fixed Expense:		
Interest on $4,300.00 @ 6%	$ 725.60	
Taxes and licenses	175.00	
Insurance	765.00	
Garage	900.00	
Driver's wages @ $4.92 a day	7,280.00	
Total fixed expense	$ 9,845.60	26.6c
Variable Expense:		
Depreciation, based on $3,983.90 ($4,300.00, less $316.10 for tires) over estimated 60,000-mile life	$ 2,455.14	6.6c
Maintenance and repair, estimated at	1,500.00	4.5
Tires, based on $316.10 over estimated 10,000-mile life	1,168.41	3.1
Fuel, 8,868 gallons gasolene @ 25c	2,217.00	5.7
Oil, 240 gallons @ 50c	120.00	0.3
Total variable expense	$ 6,460.55	20.2c
Total cost	$16,306.15	46.8c
Cost per day, 25 miles @ 46.8c	$11.70	
Cost per gallon	0.0047	
Cost per gallon-mile	0.0008	

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Correspondence

General Correspondence, Criticisms, Suggestions, and Discussions Concerning Any Subject of Interest to Those Who Design, Manufacture, Sell or Use Commercial Motor Vehicles, Their Parts or Accessory Equipment, Are Solicited

More Railroad Propaganda

To the Editor:—Have you read the *Sunset Magazine* lately? It might be well to read the series of articles dealing with motor vehicles and motor vehicle legislation, which were started in the April issue of that publication and to follow them through, without, however, sending in your subscription. They are certainly interesting as far as they have gone.

Perhaps you can help us answer the question which arose in our minds as to who was putting up the "jack" for this series. We thought first that they might have been gratis, then we happened to remember that one of our trans-continental railroads—we don't want to mention names, but simply that it has its terminus at San Francisco—formerly operated that magazine and then it looked as though it might be an appeal for membership for one or the other of the auto clubs.

As far as the articles themselves were concerned we certainly got quite a "kick" out of the author's description of that poor little railroad which started at San Francisco and ended nowhere down in "Greenpeaville"—if we were describing it we would have said Artichokeville—and of how those nasty buses and those giant demonical commercial trucks put it out of business through their ability to compete over a public highway in competition with a private roadbed. It is rather an unfortunate example, for well do we remember the one daytime train each morning in winter and two in summer wheezing along; the privately-owned passenger-cars which made up over 90 per cent. of the traffic over the road; the fact that the trucks complained of were for the most part owned and operated non-commercially and further the fact that a larger part of the roadbed over which these vehicles moved never saw a sack of cement except as a surface hardener. We also wondered where the cops were when these trucks were mutilating the road. They always seemed to be quite prominent if we neglected to sound the horn around the curves when we were traveling this road.

We must certainly give the writer of these articles the credit for having a breezy style and a vivid imagination. The way that man can throw statistics and jump from figures having reference to California only to national ones and then back again all in the same breath! We wonder what impression is left in the minds of his readers when, after dealing a while on California he asks (in heavy type) "for whom have we spent two billions on hard-surfaced roads in ten years." We always thought the sum spent in California was one hundred millions.

The first broadside seems to be aimed principally at the motor 'bus. We are holding no brief for the latter in any way, shape or form, but we do not believe that exaggerated statements serve to hurt the motor truck operator doing business along proper lines in any way. We also jammed on the brake when we read the opening paragraph of the series reading "When you drive down the crowded highway on a Sunday, taking your family for an airing, and a big 8-ton 30-passenger interurban 'bus comes sweeping down the middle of the road at 30 miles an hour," etc. It certainly is a vivid picture, but did you ever see an interurban 'bus on other than pneumatic tires? Did you ever see a pneumatic tire for an 8-ton truck? Did you ever hear of an 8-ton bus? Did you ever hear of a large truck being driven 30 miles an hour whether the highway was crowded or not? We presume the 'bus referred to was pneumatic tired, as there is a speed limit of 15 miles per hour on solid-tired vehicles carrying over 12,000 pounds.

If these articles are models of what we are going to get in the succeeding ones we feel sorry for the poor truck operators. Read the articles by all means and let us know what you think of them. Some day we might get our "Irish" up to the extent of taking a "crack" at them.

SECRETARY.
San Francisco, Cal.

Advice to 'Bus Operators

To the Editor.—We have heard much, through the press and otherwise, of what has been termed the "disgraceful overcrowding and congestion of present transit facilities." Yet here in New York, a city which enjoys the most wonderful and safest transportation system the world has ever known, there is continued insistence that a service shall be rendered at a price which represents an actual loss to those furnishing it. No other service, public or private, is demanded on such terms by our people. Fair and square in everything else, they obstinately insist on what has come to be known as "the 5-cent fare." Their attitude is so untrue to the real American spirit of square dealing, that it is difficult to understand.

For the first time in our history we find our people demanding something for which they are unwilling to pay a fair price. Not only are they forcing the transportation companies to economies which necessarily reflect themselves in the service given and the indignities which, in consequence, must be suffered by us, but they are choking off the development of our subway systems, and frightening capital away from traction investments which must be made by private citizens, if our rapidly growing transportation needs are to be met.

The editors of the periodicals dealing with transportation vehicles, particularly the motor 'bus, have a great responsibility. They are in a position to warn the users of this new medium in the transportation field against the mistakes and malpractices of the older forms of transportation. Unless the operators of 'buses take counsel with themselves and steer clear of some long-standing transportation evils, 'bus transportation is likely to fall into the same disrepute as the street-railways.

Perhaps nothing has encouraged public ill-will toward the street-railways more than the practice of "packing them in," until the over-crowding is unbearable. Street-railway organizations claim they have to do this in order to make money. But the 'bus operator can adopt a seat-for-every-passenger rule and really make more money than if he resorted to overcrowding and permitting "standees" in his 'bus.

There is another point which the 'bus operator should consider. His vehicle is not kept in a comparatively straight and rigid course by steel rails. The advantageous flexibility of a 'bus in steering its course at will through a thoroughfare has its disadvantages if standees are permitted. For the shifting of the weight of these standees when the 'bus swerves tends to make the 'bus unsafe. Moreover, it is likely to throw the passengers about inside the vehicle, thereby rendering the 'bus operator liable to heavy damages for accidents.

CHARLES A. SCHREIBER.
New York City.

Wood Wheel Body Again Active

The Automotive Wood Wheel Manufacturers' Association has resumed its activities, as the trade organization of the motor vehicle wood wheel industry, at its old offices at 105 West Monroe street, Chicago. At a recent election of officers Thomas A. White, president of Crane & MacMahon, Inc., St. Marys, Ohio, was chosen to guide its destinies this year as president, and C. F. Field, general sales manager of the Hayes Wheel Company, Jackson, Michigan, was elected vice-president. C. C. Carlton, secretary of the Motor Wheel Corporation, Lansing, Michigan, St Vance Lovenstein, president of the Schwarz Wheel Company, Philadelphia, and Mr. Field are the trustees of the association, which is organized as a corporation not for profit under the laws of Ohio. The officers and trustees have elected Hargrave A. Long as secretary and treasurer of the association. Mr. Long has acted in a similar capacity since 1919, and is in charge of the central office in Chicago.

The Kelsey Wheel Company, Detroit, has a schedule of 81,000 sets, four wheels and five rims, for May, which will make the month the largest from the point of production in the history of the company. Of these, about 30,000 sets are Fords and the remainder is divided among Studebaker, Hupp, Cadillac, Dodge Brothers and others. Ford business comprises about 37 per cent of the total.

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New Torbensen Axle Coming

Viggo V. Torbensen has formed the Vig Tor Axle Company for the manufacture in Cleveland of passenger-car and truck axles. For a number of years Torbensen served as president of the Torbensen Axle Company and has been active in the industry for the last twenty-six years. The axle the new company will make has been designed by him.

A. L. Kroesen, who will be vice-president and general manager, was for a number of years connected with the Detroit-Timken Axle Company of Detroit. He came to Cleveland to become director of production for the Eaton Axle Company. W. N. Jackson, treasurer of the new company, has been associated with Mr. Torbensen for several years. Carl R. Harrison, secretary, is vice-president of the City and Suburban Realty Company. B. A. Fleming, assistant secretary, is a graduate of the University of Kansas Engineering School and has been making a study of production methods in the axle business for some years. The directors are Messrs. Torbensen, Jackson, Harrison, and Joseph Lyons, president of the Lyons Machine Company, Cleveland.

Motor Trucks for Cash

Manufacturers of motor trucks have observed recently an increasing volume of cash sales and a diminishing volume of credit sales in New York and vicinity. By overloading a 5-ton truck, it can be made to carry 350 cases of whiskey. The regulation price for moving this sort of contraband from Jersey towns to New York is $10 a case, cash in advance. The trucker takes few chances, as the owner of the whiskey or his representative accompanies the load, and carries in his pockets $5,000 in currency—the accustomed sum—to ward off possible trouble. As the transportation charge on such a load is $3,500, or about the price of the truck, it is easy to see why the manufacturers and dealers are not being pressed too hard for credit, says the *Wall Street Journal.*

Packard Business at Peak

The Packard Motor Car Company is operating on a greater employment and production basis than ever before and is planning to increase operations further.

Introduction last month of a new series of single-six passenger-cars is mainly responsible for increased activities. In the ten days following public announcement of the latest model gross sales of single-sixes, twin-sixes and trucks approximated $8,250,000. Sales of single-sixes alone represented approximately $5,700,000. This is the largest volume of business ever done by Packard in a similar time.

Truck sales show a heavy increase over the corresponding period of 1921, in spite of the fact that all Packard truck production is in sizes of two tons and upward.

A factor of present demand which officials feel is significant, is the absence of "spottiness." Business is not confined to limited territories, but is nation-wide.

MOTOR VEHICLE REGISTRATIONS AND REVENUES FOR THE YEAR 1921.

State.	Total Trucks and Cars.	Passenger-Cars.	Trucks.	Taxi-cabs 'Buses.	Trail-ers.	Motor-cycles.	Re-reg-istra-tions Tr'sfers.	Owners' and Chauf-feurs' Li-censes.	Manu-factur-ers' and Deal-ers' Li-censes.	Total Gross Registration and License Revenues. (xxx)	Gross Revenues from Gasolene Tax.	Revenues Available for Road Work — By or Under State Highway Department.	Under Direction of Local Authorities.
Ala. ..	82,366	69,422	9,110	3,834	.....	810	.....	4,862	270	$ 1,147,265.00	.....	$ 917,812.00	.....
Ariz.	35,611	31,069	3,980	562	.....	440	1,638	35,005	228	195,969.75	$ 87,928.35	195,969.75	.....
Ark. ..	67,408	66,480	928(b)	.....	4	174	.....	449	451	856,543.60	170,000.00(e)	256,963.08	$ 599,580.52
Calif.	680,614	645,522	35,092	.....	.....	17,729	220,000	71,425	2,719	6,834,089.52	.....	3,018,192.36	3,018,192.36
Colo.	145,739	136,336	9,403	.....	45	2,868	10,883	7,340	2,487	906,059.27	559,472.22	410,158.10	410,158.10
Conn.	134,141	108,692	24,112	1,337	.....	5,282	18,425	150,681	719	2,129,861.12	176,489.47(g)	2,129,861.12	.....
Dela.	21,413	21,413(a)	.....	.....	67	541	.....	24,486	587	375,469.00	.....	375,469.00(c)	.....
D. of C.	40,625(d)	33,654	5,177	1,794	.....	1,101	.....	6,884	744	209,583.00	.....	.....	.....
Fla. ..	97,957	83,111	14,846	.....	.....	1,296	2,483	2,516	747	734,845.50	283,867.15(x)	570,401.51	.....
Ga. ...	131,976	131,976(a)	.....	.....	.....	1,232	2,232	4,705	659	1,705,941.24	302,157.82(f)	1,705,941.24	.....
Ida. ..	51,294	46,935	4,359	.....	.....	744	931	742	369	841,212.92	.....	210,303.23	630,909.70
Ill. ...	663,348	583,441	79,907	.....	.....	8,898	.....	69,231	7,086	6,803,556.21	.....	6,776,781.17(c)	.....
Ind. ..	400,342	357,025	43,317	.....	1,851	7,524	.....	11,360	1,569	2,422,227.00	.....	2,281,276.00	.....
Iowa .	461,084	430,118	30,966	.....	344	3,897	112,994	17,250	1,755	7,719,127.47	.....	7,217,384.19(h)	.....
Kan. (i)	289,539	267,891	21,648	.....	.....	2,271	4,393	.....	1,770	1,400,000.00	.....	1,400,000.00(j)	.....
Ky. ..	126,802	110,602	15,025	1,175	.....	.....	.....	8,739	739	1,771,887.02	411,938.95	1,771,887.02	.....
La. ..	77,885	67,311	10,574	.....	.....	479	.....	.....	582	453,276.00	.....	453,276.00	.....
Me. ..	77,527	67,591	9,936	.....	.....	1,525	7,949	95,129	791	1,004,750.25	.....	496,460.64(k)	.....
Md. ..	136,249	120,231(l)	11,597(m)	4,421	.....	5,271	11,085	57,958	3,390	2,460,162.04	.....	1,750,000.00	.....
Mass.	360,732	305,471	55,261	.....	472	12,048	45,000	380,519	1,899	4,717,389.30	.....	4,717,389.30(n)	.....
Mich.	476,452	426,687	49,765	.....	4,330	6,195	42,996	183,248	1,737	6,751,924.51	.....	3,135,040.24	3,126,456.14
Minn.	323,475(o)	299,100	24,375	.....	820	3,150	15,900	9,207	1,867	5,672,424.61	.....	5,672,424.61	.....
Miss. .	65,039	65,039(a)	.....	.....	.....	.....	.....	.....	.....	751,946.63	.....	649,345.44	.....
Mo. ..	346,437	346,437(a)	.....	.....	.....	3,609	17,850	26,100	2,102	2,505,353.90	.....	2,505,353.90	.....
Mont.	58,785	58,785(a)	.....	.....	.....	472	650	597	293	594,520.50	228,799.33(e)	274,016.52	274,016.52
Nebr.	238,704	219,781	18,923(p)	.....	322	1,866	16,920	2,306	.....	2,824,811.25	.....	2,116,746.94	705,582.31
Nev. .	10,821	10,000(q)	821	.....	.....	131	156	.....	74	102,800.00	.....	97,200.00(c)	600.00
N. H.	42,039	36,994	5,045	.....	.....	2,358	6,045	52,350	292	876,322.14	.....	790,129.36	.....
N. J.	272,994	248,477	24,517	.....	857	9,724	52,849	348,886	2,079	3,974,063.75	.....	3,733,686.42	.....
N. M.	22,559	21,155	1,404	.....	.....	152	500	.....	.....	198,632.77	(xx)	194,051.79	.....
N. Y.(r)	812,031	630,791	148,553	32,687	3,313	26,998	.....	244,173	3,872	10,288,858.25	.....	7,716,643.69	2,572,214.56
N. C. (i)	148,627	134,884	13,743	.....	.....	1,274	.....	.....	937	2,259,240.43	506,018.76(s)	2,259,240.43	.....
N. D..	92,644	90,221	2,423	.....	.....	811	6,261	.....	.....	683,052.45	.....	201,526.23	201,526.23
Ohio .	720,634(t)	622,044	98,590	.....	4,801	17,203	32,878	.....	15,724	6,894,159.73	.....	3,250,125.45	3,456,355.45
Okla. .	221,300	221,300(a)	.....	.....	.....	1,013	.....	.....	967	2,619,713.49	.....	.....	2,354,549.43
Ore. .	118,198	103,735	14,360(i)	103	290	3,164	.....	182,971	516	2,334,931.25	935,126.24	1,665,000.00	565,000.00
Penn.	689,589	632,541	57,048	.....	951	21,111	75,559	129,026	13,255	9,470,174.31	835,325.64(g)	9,470,174.21	.....
R. I...	54,608	43,662	9,693	1,253	41	1,751	7,593	65,937	210	848,723.59	.....	764,483.16	.....
S. C.	89,836	82,993	6,843	.....	59	.....	1,394	.....	668	741,114.79	.....	587,056.07	.....
S. D.	119,274	110,997	8,277	.....	.....	.....	.....	.....	636	720,587.00	.....	.....	648,528.30
Tenn.	117,025	102,795	14,230	.....	.....	1,043	6,309	.....	478	1,387,870.10	.....	661,655.46	661,655.46
Tex. .	467,616	467,616(a)	.....	.....	.....	3,905	113,809	17,100	2,296	3,806,395.25	.....	1,865,079.58	1,852,562.49
Utah.	50,185	40,562	9,623	.....	.....	909	.....	1,006	200	441,359.88	.....	432,959.82(c)	.....
Vt. ...	37,265	33,778(v)	3,487	.....	.....	965	4,196	44,987	261	668,288.50	.....	618,288.50	.....
Va. ..	139,200	122,000	17,200	.....	.....	2,100	10,100	5,140	600	2,021,146.09	.....	1,970,702.66	.....
Wash.	185,359	154,239	27,739(w)	3,381	797	3,913	12,727	215,000	3,023	3,140,730.74	471,847.53	2,800,030.74	.....
W. Va.	93,940	77,397	16,543	.....	.....	1,539	12,000	12,756	1,322	1,250,525.82	.....	1,250,525.82	.....
Wis. .	341,841	320,577	21,264	.....	.....	6,423	17,153	.....	2,120	3,671,645.50	.....	2,568,109.13	856,036.37
Wyo.	26,866	23,966	2,900	.....	.....	322	609	.....	150	288,121.88	.....	288,121.88	.....
Totals	10,466,995	9,432,844	982,604	50,547	22,685	197,418	892,464	2,359,188	85,240	122,478,654.34	4,968,971.46	94,193,243.86	21,923,923.94

a. Includes motor truck registrations.
b. Trucks registered since May 1, others included under passenger-cars.
c. To pay interest and principal on state Highway bonds.
d. Does not include 8,439 non-resident passenger-cars and 1,023 non-resident trucks.
e. For period May-December, inclusive.
f. For period August 10 to December 31, inclusive.
g. For period September-December, inclusive.
h. To State primary road fund.
i. For period July-December, inclusive.
j. Devoted to State aid and special road drag funds.
k. Does not include about $500,000 used to pay interest and principal on State highway bonds.
l. Includes approximately 12,000 non-resident passenger-cars.
m. Includes approximately 2,000 non-resident trucks.
n. Devoted to road work in accordance with appropriations by legislature.
o. Does not include 1,752 cars and trucks owned by State, cities and counties.
p. Includes motor 'bus registration.
q. Does not include 179 cars owned by State and cities.
r. Eleven months, February-December, inclusive.
s. Period March-December, inclusive.
t. Does not include 2,800 cars and trucks owned by State, cities and counties.
u. Includes 5,223 commercial vehicles of less than 1 ton capacity.
v. Does not include 490 cars and trucks owned by State and cities.
w. Does not include 1,891 State vehicles.
x. Period June 20-December, inclusive.
xx. Amount to be collected now before courts for determination.
xxx. Does not include revenues derived from gasolene-parts.

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of all the metal wheels on motor trucks are SMITH WHEELS. Why? Because they are 100% right in design; 100% right in quality and 100% dependable.

The amount of a truck-maker's business nowadays is measured by the amount of his truck sales. SMITH WHEELS help sell trucks. They first sell the eye, then their performance helps keep the truck sold.

In selling trucks equipped with wood wheels in this metal age, the wood wheels in themselves put up a great sales resistance.

Our business in volume is almost back to where it was in the abnormal days of the war. Place your requirements with us as far ahead as possible to assure satisfactory deliveries.

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SYRACUSE, N.Y. U.S.A.

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LEADING American makers are building their cars and trucks, and their reputations, about the sturdy "backbone" of Sharon Frames — because they know that a car or truck is no better than its frame, and they demand known quality in this part. They have learned by experience that Sharon Quality matches their own—that Sharon standards are as exacting as theirs—and that an order placed with Sharon is delivered on scheduled time in scheduled quantity. May our engineers work with yours?

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General Motors Trucks

Chassis List Prices

1 Ton - - -	*$1295*
2 Ton - - -	*2375*
3½ Ton - -	*3600*
5 Ton - - -	*3950*

At the Factory—Tax to be added

An Opportunity for Better Business

No other line of motor trucks offers the improvement in design and construction of GMC Trucks.

No other line of motor trucks sells for as low a price in comparison to its value.

These are the reasons why a General Motors Truck dealership is the most valuable franchise that can be obtained by any motor truck retailer.

Add to them the well established reputation of GMC trucks, of the company that builds them and that of its parent organization, the General Motors Corporation.

Couple with that the fact that during the recent financial depression, not one GMC distributor failed in business. A dealer should be certain always that his distributor and manufacturer are permanent business concerns.

Moreover, he should seek the line which has a large national organization. In this particular, GMC also is a leader with branches and distributors in every section.

Consider that in selling GMC trucks, you are selling improvements which no other motor trucks have. You have a sales story about GMC that cannot be duplicated.

Such a distinctive feature as the GMC Two-Range Transmission, giving more pulling power and more speed in the heavy models, and doing it with no increase of size in the power plant—

Such features as Removable Cylinder Walls, Removable Valve Lifter Assemblies, Pressure Lubrication, built-in Electric Lighting Equipment, and many others—

All these make GMC trucks better units of transportation, and consequently better units for you to sell.

There can be no finer opportunity for any motor truck dealer from the standpoint of quality, reputation and price.

GENERAL MOTORS TRUCK COMPANY

Division of General Motors Corporation

Pontiac, Michigan

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Over-Mountain Records in January

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The last 369 miles was a dash over the icy mountain roads from Pittsburgh to Trenton in nine hours and fifteen minutes.

The car was a stock four passenger Sporting model with its **regular equipment of Brown-Lipe-Chapin Differentials.**

Such dependability of differential gears is of value to the car owner not only in the original equipment, but in the ultimate renewal of such vital parts.

BROWN-LIPE-CHAPIN
DIFFERENTIALS

BROWN-LIPE-GEAR
TRANSMISSIONS

Both at Syracuse N.Y.

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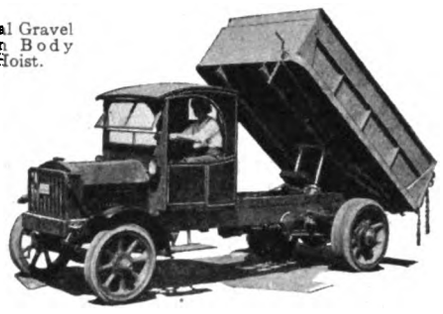

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This Combination Body will suit your customer exactly. It will save him money for it can be used for a great variety of purposes.

Our whole line of equipment is illustrated in our new catalog No. 120. It includes specification tables and prices on all kinds of Bodies, Hoists and Tanks. It's a reference book you should have. Write for your copy today.

THE HEIL CO.
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Combination Body converted into a platform by removing sides and lowering tail gate.

Announcement

Being convinced that a fabric disc joint within its limitations offers certain advantages, we have supplemented our line of all-metal joints with a corresponding line of fabric disc joints and now offer them for early delivery.

The same quality of materials and excellence of workmanship which the trade attributes to our all-metal assemblies are incorporated in our fabric disc joint assemblies.

We solicit an opportunity to familiarize you with certain original features and details of our new design.

Making both lines, i. e., all-metal and fabric disc joints, you may rest assured that our recommendations will be made on the basis of *your* needs.

Blood-Brothers Machine Co.

Pioneer Builders of Universal Joints

ALLEGAN — F. Somers Peterson Co. San Francisco, Cal. Western Representative — MICHIGAN

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MOTOR TRUCKS

Model 33, 1½-2 Ton Bus

Operated by

STAR TRANSPORTATION COMPANY
MASON CITY, IOWA

SWIFT - ECONOMICAL - POWERFUL

Denby Motor Truck Company
DETROIT, U. S. A.

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Speed! Hauling is a racing game—a race against time, delays, accidents, pay-rolls, schedules. Don't discount the admitted greater speed of the Pierce-Arrow.

Pierce-Arrow
TRUCKS

The Pierce-Arrow Motor Car Company
Buffalo, New York

2-ton $3200 3½-ton $4350 5-ton $4850 fully equipped

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Lee Trailer & Body Company, Chicago.
Wood Hydraulic Hoist & Body Company, Detroit.

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Whitney Manufacturing Company, Hartford, Conn.

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Smith Wheel, Inc., Syracuse, N. Y.

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Brown-Lipe-Chapin Company, Syracuse, N. Y.

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Buda Company, Harvey, Ill.
Continental Motors Corporation, Detroit.

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Sharon Pressed Steel Company, Sharon, Pa.

HOISTS.
Heil Company, Milwaukee.
Hough Mechanical Hoist Company, Chicago.
Wood Hydraulic Hoist Body Company, Detroit.

MOTOR FIRE APPARATUS.
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MOTOR TRUCKS.
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Autocar Company, Ardmore, Pa.
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International Harvester Company, Chicago.
International Motor Company, New York.
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1369 Broadway, New York City.

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Wanted
SUPERINTENDENT

for auto truck body plant located in St. Louis. Must be experienced and competent to take full charge. State salary expected, qualifications and references in first letter.

—Power Wagon C-501

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Gar Wood says:

"Success in building Hoists and Bodies, as well as racing speed boats, depends on correct designing, right materials and painstaking, superior workmanship."

Gar Wood

Built by "Gar Wood"

From Coast to Coast, and from Border to Border, Wood-Detroit Hydraulic Hoists and Steel Bodies are helping build better roads—are handling sand, gravel and stone better, faster and more cheaply than is possible with any other means.

WOOD DETROIT

There is a type of Wood-Detroit Hoist and a Wood-Detroit Dump Body exactly fitted to every need. Wood engineers, working with the truck makers, have developed the line to cover all branches of industry requiring proven dumping trucks.

Write us of your problem—tell us the size and make of your truck and the commodity you want to handle —and we will quote on the equipment to fit your needs.

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Sales and Service in all Principal Cities

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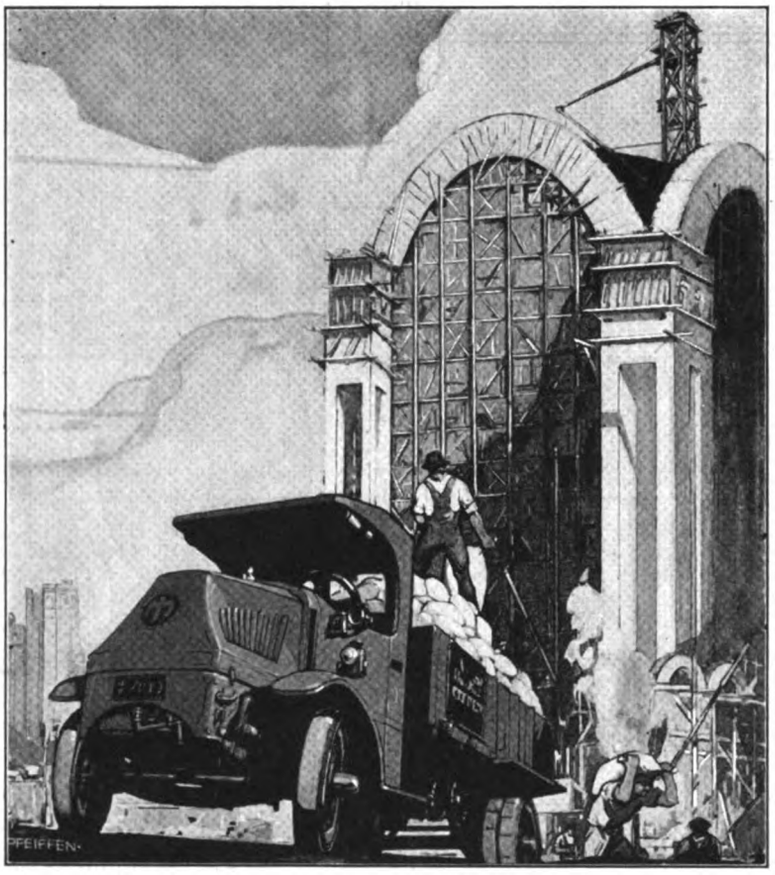

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There is some Mack territory available, possibly in your locality.

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Branches owned by this Company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK INTERNATIONAL MOTOR TRUCK CORPORATION."

Capacities 1½ to 7½ tons. *Tractors to 15 tons.*

Mack TRUCKS

PERFORMANCE COUNTS

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LATEST ROLLER CHAINS HAVE SPECIAL QUALITY SOLID ROLLS AND OTHER IMPORTANT IMPROVEMENTS

HIGH EFFICIENCY
ROLLER AND SILENT TYPE

CHAINS

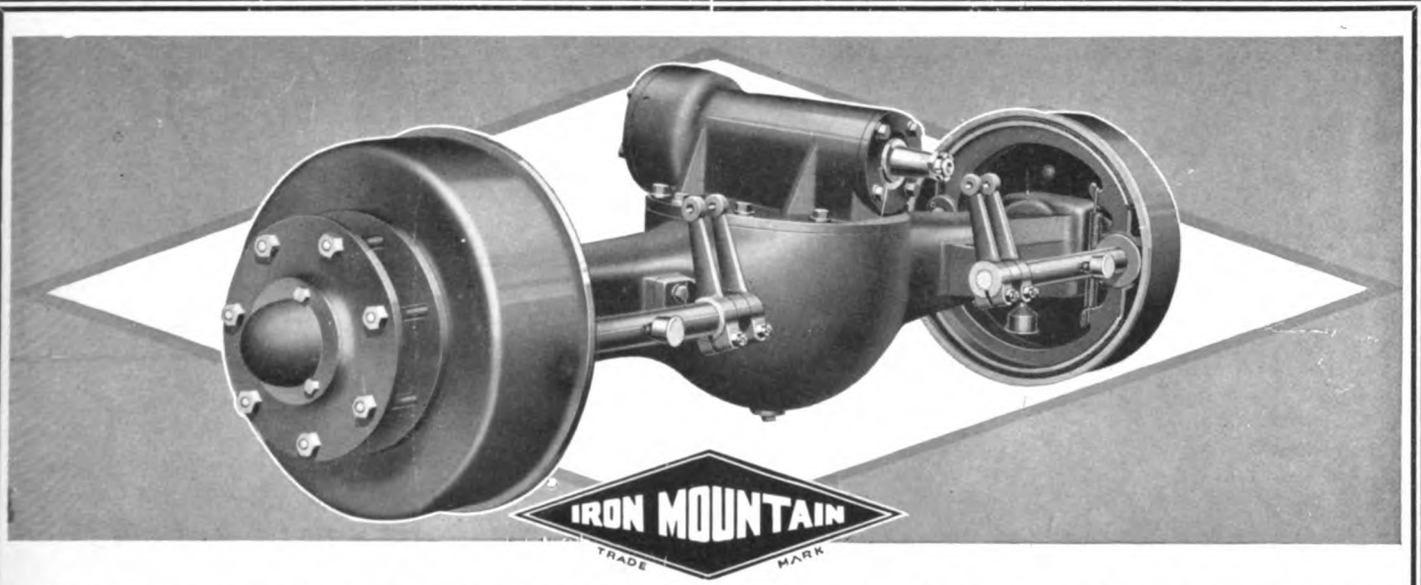
also *Low* Cost per *Thousand Miles* of Service

Front End Motor Chain Drives

EXCEPTIONAL MILEAGE AND NEVER KNOWN TO SKIP THE SPROCKET TEETH

THE WHITNEY MFG. CO.

HARTFORD, CONNECTICUT, U. S. A.



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¾, 1, 1½ and 2½ Tons. Designed Right—Built Right.

Guaranteed to give 100% satisfaction in strength and service. Tell us about your requirements and let us estimate your needs.

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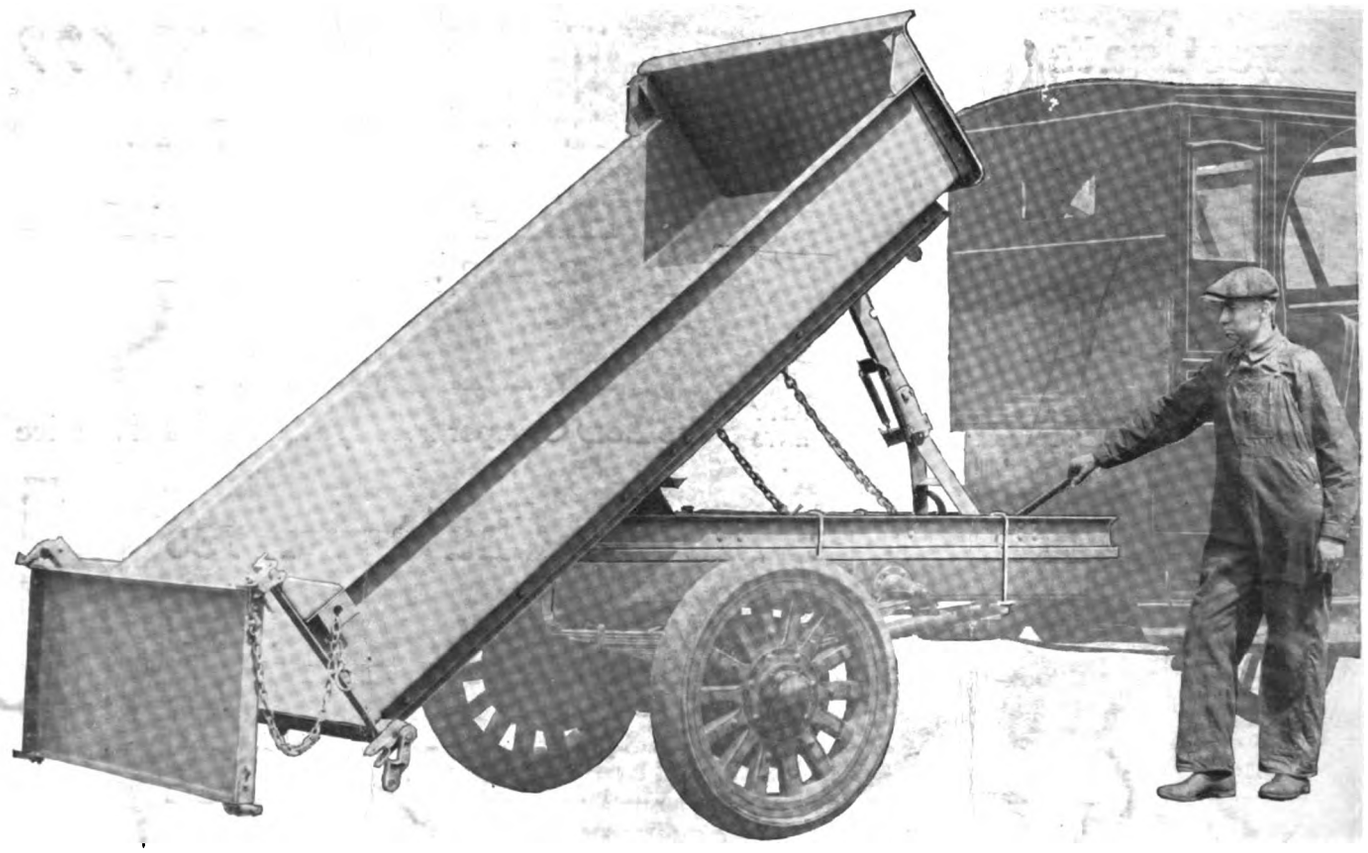

HOW MANY COMPLAINTS HAVE YOU HAD

On account of worn pumps, chains, clutches, broken cables, wrenched toggles and other accidents to the old-fashioned body-hoisting mechanisms on your customers' trucks? Isn't it high time to recommend and sell LEE equipment and evade the grief? Wouldn't it be better business to supply a type of body that is fully as efficient and foolproof as the truck you sell? Doesn't an unsatisfactory hoist and body impair the effectiveness of the entire machine and jeopardize your customers' good opinion of the product to which you have linked your name?

For all loads from 2 to 6 cu. yds. the new LEE heavy duty steel dumping body is the simplest and most efficient equipment available. Automatic, instantaneous, positive action obtained without the use of man or machine power, freedom from costly and annoying service interruptions, a dumping angle sufficiently great to move the stickiest loads quickly and easily, and remarkably low first cost as well as up-keep—these are its outstanding features.

Picture a body of practically indestructible RECTANGULAR construction, with automatic double-acting tailgate, without troublesome and complicated actuating mechanism—a type of equipment that operates in a natural manner by the utilization of natural forces, that raises to the desired dumping angle and automatically locks into the raised position—a thoroughly reliable and long-lived mechanism that will move the heaviest load the truck can carry in less than half a minute, and you will have a fair idea of what this wonderfully efficient equipment can produce in hauling dividends. And then remember that seven years of development work lie back of this new LEE product and that it embodies principles that have been tested and proved correct in the hands of thousands of users of LEE dumping equipment.

Full information furnished on request

LEE TRAILER & BODY CO.

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62
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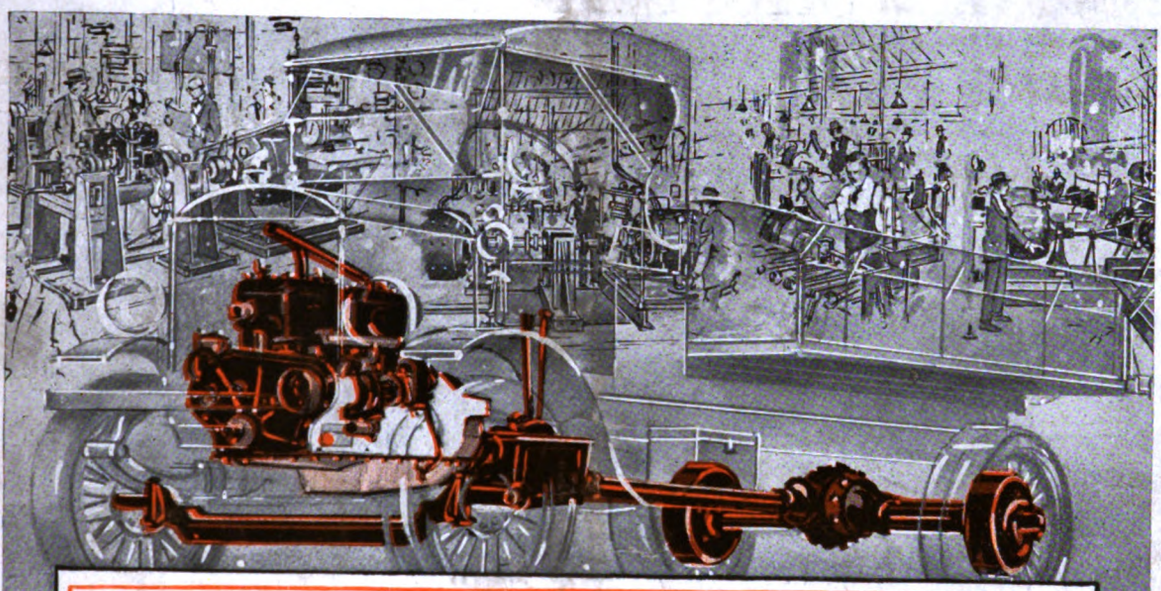
POWER WAGON

NUMBER 212 CHICAGO, JULY, 1922 Price 25 Cents

E.M.



Back of the SPECIALIZED truck

Skill and equipment concentrated to a degree not possible in any one organization

Today the truck buyer looks not only at the truck but, with keen understanding, at the production methods and standards back of it.

The SPECIALIZED truck holds his interest because in each of its major units it represents concentration of skill, specialized training and specialized equipment. No lost motion, no dissipated energies—but the undivided and untiring attention of SPECIALISTS to each unit, until, in material, in mechanical principle and in operation, perfection is achieved.

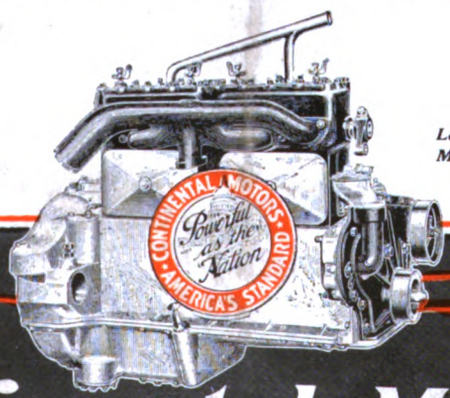
Add to this the efficient distribution of genuine replacement parts in parts-stations throughout the world—and you have the reason for the growing demand for the SPECIALIZED truck—the truck of *proven* units.

Truck dealers are rapidly recognizing the advantages of identifying their organizations with the SPECIALIZED truck—the demand for which is sustained by the matchless service of such *proven* units as that standard of motor dependability—the Continental Red Seal.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, U. S. A.

Factories: Detroit and Muskegon



Largest Exclusive Motor Manufacturers in the World

Continental Motors

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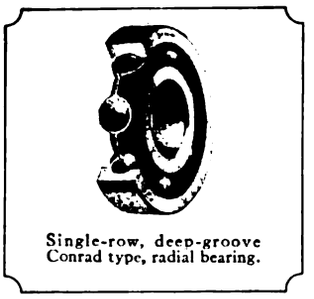
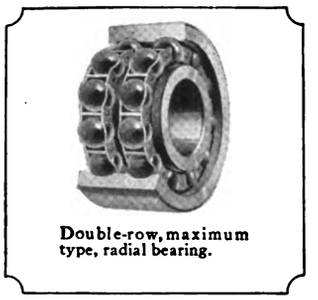
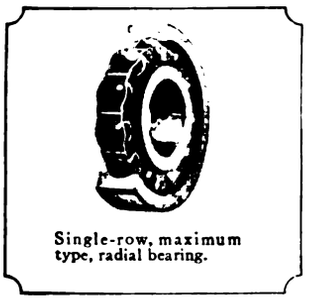


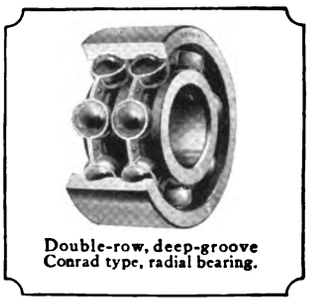
Single-row, deep-groove Conrad type, radial bearing.



Double-row, maximum type, radial bearing.



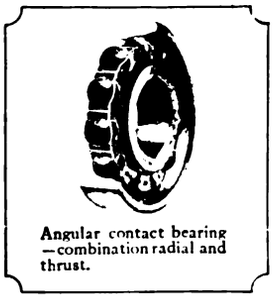
Single-row, maximum type, radial bearing.



Double-row, deep-groove Conrad type, radial bearing.

Strom Bearings

Meet All Truck Requirements



Angular contact bearing —combination radial and thrust.

In truck installations the selection of the right type and size of bearing is highly important.

That is why Strom Bearings are made in such a complete range of types and sizes.

Strom BEARINGS

"Wherever a shaft turns" on a motor truck, you will find a Strom radial, (single and double row) thrust or angular contact bearing to fit the need.

Our large staff of engineers will be glad to work with you in determining the type and size of bearing that will give you the best results. Write for catalog and price list.

U. S. BALL BEARING MFG. CO.

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Single-acting thrust bearing with flat seats (grooved races). 1100-F Series.

Double-acting, self-aligning thrust bearing with leveling washers 2100-U Series.

Double-acting thrust bearing, flat seats. 2100-F Series.

Double-acting, self-aligning thrust bearing 2100 Series

Single-acting, self-aligning thrust bearing. 1100 Series.

Single-acting, self-aligning thrust bearing, leveling washer. 1100-U Series.

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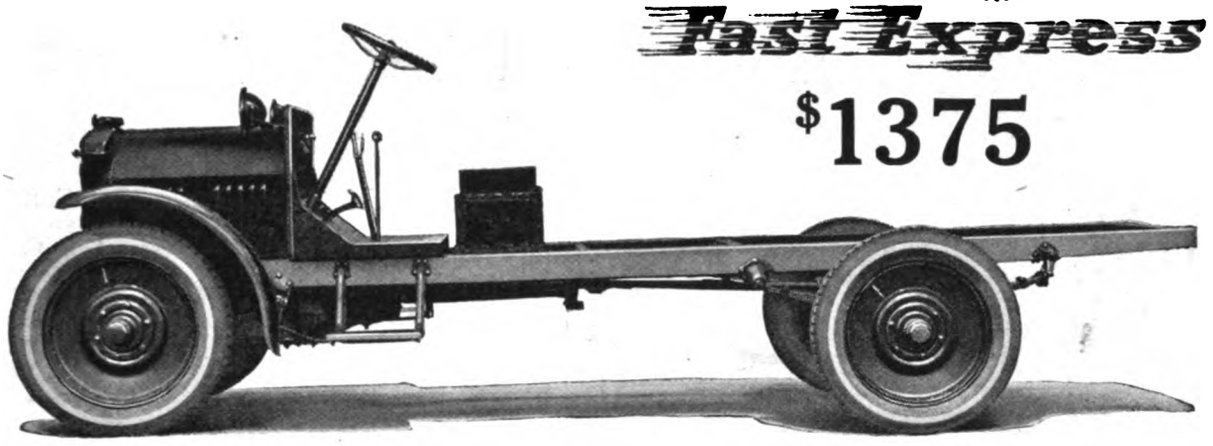
FEDERAL Fast Express



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Another FEDERAL

For the Big Volume Field

THERE has never been a better truck than FEDERAL; now there is none more rapid, more flexible, more economical at anywhere near its price. Its superior worth is assured, not only by the reputation of its makers, but by the high quality of the thoroughly-tested specialized units in every part of its construction.

This new FAST EXPRESS—at $1375—offers an unusually profitable opportunity to dealers. It enables them to offer the rapidly-expanding light delivery market a truck unusually speedy, yet one retaining in every detail of its construction those essentially Federal qualities: dependability, long life and economy.

In Every Detail—It's a FEDERAL

With Specialized Units

CAPACITY—2000 lbs.; body allowance, 900 lbs.; chassis weight, 2950 lbs.; total, 5850 lbs.; wheelbase, 132"; tread, 56"; loading space back of seat, 110 inches.

MOTOR—Continental J-4; 4 cylinders; L-head; Mono Block type; 3-bearing crank shaft; 3-point suspension; force feed lubrication system through hollow crank shaft; bore, 3¾"; stroke, 5"; 30 horsepower at normal engine speed.

IGNITION—Eisemann Magneto with manually controlled spark.

CARBURETOR—Zenith; central jet, float feed, automatic.

COOLING SYSTEM—By fan and water circulated by centrifugal water pump of ample proportions through a Federal type detachable core radiator with pressed steel tanks and side members chemically treated to prevent rust.

CLUTCH—Borg & Beck dry plate; two 10" asbestos fabric discs enclosed in Bell housing; easily adjusted for wear.

TRANSMISSION—3 speeds forward and one reverse; selective; sliding; stub tooth; spur gear type; mounted on flywheel housing; splined main shaft; annular ball and roller bearings of generous size throughout.

PROPELLER SHAFTS—Tubular, provided with three Universal Grease tight joints of ample proportions. Supported at center on self-aligning ball bearings.

REAR AXLE—Timken-Detroit; worm drive with differential mounted on Timken-Roller bearings; semi-floating; completely enclosed in one-piece pressed steel housing; gear ratio standard 5.6 to 1.

FRONT AXLE—Timken-Detroit; drop forged I-beam; tapered roller bearings.

BRAKES—Internal duplex; expanding type; 15" x 2½" foot and emergency, each having four Raybestos faced shoes operating in drums on rear wheels.

FRAME—Pressed steel; channel section; ¼" thick; 5" deep at center; 30½" wide at front and 34" wide back of seat; height from ground loaded, 29½".

SPRINGS—Chrome Vanadium steel; semi-elliptic type; front, 38" x 2¼"; rear, 50" x 2½"; 8 leaves rear.

STEERING GEAR—Gemmer irreversible type; worm and worm wheel; ample adjustment for wear; bearings of generous size; 18" hand wheel.

GASOLINE SYSTEM—Sheet steel tank; 12½ gals.; tinned inside and out; mounted on chassis under seat, with Stewart vacuum tank on dash under hood.

WHEELS—Dished and tapered demountable disc wheels; valve connection outside.

TIRES—Pneumatic U. S. Royal cords; truck type; non-skid; 33 x 5" front and rear.

CONTROL—Transmission and brake levers mounted on transmission housing, center of chassis; steering gear column on left; accelerator pedal on toe board; hand throttle and spark control lever on steering column; ignition switch and carburetor choke are provided on the dash.

CHASSIS LUBRICATION—Alemite grease connections with efficient high pressure grease gun; no grease cups to be filled by hand.

DASH EQUIPMENT—Dash, toe boards, fenders and running boards heavy pressed steel floor board wood.

ELECTRIC EQUIPMENT—Remy electric starter and generator; electric horn; electric side, tail and dash lights with special hard service battery mounted under seat, easily accessible

CHASSIS PRICE—$1375 f. o. b. Detroit, freight and war tax additional. Price includes complete set of tools, jack, oil can and hand pump.

This Federal Fast Express completes a line that now satisfies every haulage requirement. It opens the 65% light delivery truck market to alert Federal Dealers. A wire or special delivery letter concerning territories will have immediate attention

FEDERAL Motor Truck Company, Detroit, U. S. A.

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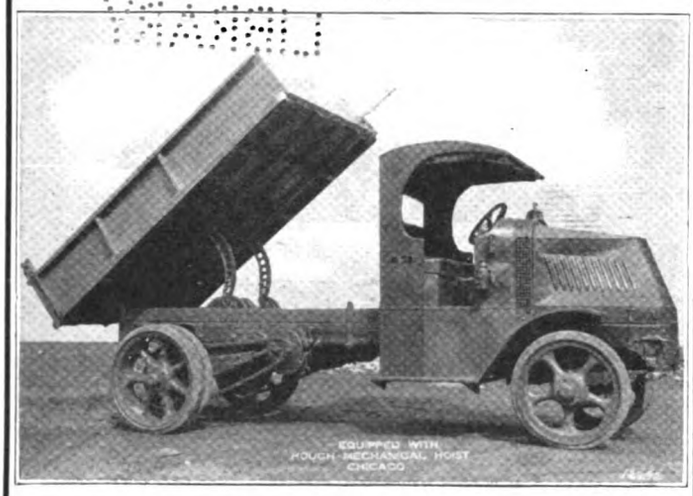

Hough Mechanical Hoist

installations become an integral part of your truck unit, carrying out the same principle of delivering the power of your motor in elevating the body through a positive gear drive identical with your own truck transmission. There being **no** oil cylinders, check valves or oil pumps. Nothing to be affected by dirt or grit, **no** valves to leak, **no** packing to become loose.

Hough Hoists boost everything but the repair man's profits.

The high dumping angle designed for road building units is an exclusive feature with Hough Hoists.

Built in three sizes, fits any make of truck.

3 Ton — 6 Ton — 10 Ton

WRITE FOR PARTICULARS

Hough Mechanical Hoist Co.

1900 Southport Ave. Chicago

POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

Published monthly by

THE POWER WAGON PUBLISHING COMPANY

544 Lake Shore Drive, Chicago, U. S. A.

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VOL. XXIX. JULY 1922. No. 212

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THE POWER WAGON PUBLISHING COMPANY

WALTER WARDROP, *President and General Manager* — STANLEY A. PHILLIPS, *Vice-President and Editor*

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EVERY purchaser of an International Motor Truck is given a Free Inspection Service Policy which guarantees inspection of the truck by a factory-trained road engineer four times a year. Not merely for the first year, nor the second, but for the life of the truck.

This Plan gives the International Motor Truck dealer a distinct advantage, and makes the International Contract an unusually valuable franchise. For two years the Company, the dealer, the owner, and the driver have been working under this Plan for greater service and increased satisfaction. They have a common interest, and each in helping the others helps himself.

If you are interested in such sales and service co-operation, and have definite facilities for motor truck representation, we suggest that you write for further details of the International Contract and the Free Inspection Service Policy.

A Complete Line

International Low-Cost Hauling Equipment is built in eleven sizes, ranging from the Model S Speed Truck to the heavy-duty freighter of 10,000 lbs. capacity. Special bodies can be furnished for every purpose.

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156" wheelbase, Unladen chassis 7400 lbs., $4100
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The H. C. Christy Company of Cleveland use three types of Autocar motor trucks. The complete Autocar line furnishes just the right transportation unit for every hauling need, because of:

modern design
light chassis weight
short wheelbase handiness
economy of space in traffic
low maintenance and upkeep
availability and low cost of parts
direct factory branch service

A motor truck is only as good as the service behind it

The Autocar Sales and Service Company

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Syracuse	New Haven	New Bedford	Atlantic City	Atlanta	Sacramento	San Jose

Direct Factory Branches of The Autocar Co., Ardmore, Pa., Est. 1897

Autocar

1897 Wherever there's a road 1922

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POWER WAGON

Vol. XXIX. CHICAGO, JULY, 1922. No. 212.

Five Months' Motor Output Raises Hopes for Big Year

"ABNORMAL SPURT" PROVES LASTING

An analysis of motor vehicle production figures for the first five months of this year reveals an amazingly rapid expansion of operations on the part of manufacturers. In January the aggregate production by all companies was 90,486 motor vehicles. The May output exceeded 252,000, a gain of more than 180 per cent. Monthly production figures for full years prior to 1922 are not available and, therefore, comparisons are impossible. In view of the fact, however, that the May, 1922, output established a new record for a single month it appears a reasonable conclusion that motor manufacturers increased their operations more rapidly in the five months ended May 31, than in any previous period of like duration.

The following tabulation shows the motor vehicle production for each of the first five months this year with the increase and percentage of increase over the preceding month:

		Increase	
		Number.	Percentage.
May (approximately)	252,000	33,454	15
April	218,546	45,204	26
March	173,342	43,842	34
February	129,500	39,014	43
January	90,486	.....	..

The achievements of motor vehicle producers are the more remarkable when it is considered that few manufacturers entered 1922 with expectations of doing anything like the business which has developed. Most companies, after the rather disappointing results of 1921, prepared for keen competition and ordered materials on practially a hand to mouth basis. The New York show in the latter part of January, followed by the Chicago exhibition, gave manufacturers the first indications that a good demand was likely to develop, despite generally pessimistic opinion througout the trade.

When a continued good demand for machines was indicated in February and March many authorities believed it only a "flash in the pan" and continued to place raw material orders in limited quantities for immediate delivery. Dealers and distributers began to call for increased allotments and rush shipments of vehicles with producers constantly striving to increase production without running the risk of building up large inventories.

A determined effort on the part of the manufacturers to keep inventories low has resulted in the literal swamping of body and parts manufacturers with business for immediate delivery. In many instances vehicle producers are being held back by inability to obtain parts not manufactured by themselves, but they appear content to lose some business rather than commit themselves too far ahead.

With half the year nearly gone it is apparent that 1922 will prove entirely satisfactory for most companies and will have given all of them the opportunity substantially to improve both financial and physical condition.

May Truck and Car Output

Figures received by the Department of Commerce show a very large increase in May in the production of trucks or passenger cars. The total truck production in May was 24,603 machines, compared with 22,227 in April, an increase of 10.6 per cent. The total production of passenger cars in May, so far reported, amounted to 231,699, compared to 197,221 in April. This is an increase of nearly 18 per cent.

Reports have been received this month from a number of companies which have not reported previously. This has necessitated a revision of the figures for earlier months. For the month of May 82 companies have reported on truck production and 91 companies on cars. With a few exceptions the following table represents the production of identical firms for each month:

1922.	Passenger-cars.	Trucks.
January	81,693	9,344
February	109,170	13,121
March	152,959	19,651
April	197,221	22,227
May	231,699	24,603

The record of motor vehicle shipments shows 33,810 carloads for May as contrasted with 18,608 for May a year ago and 31,334 for this April. Drive-aways totaled 28,710 machines in May, 15,193 in May a year ago, and 22,381 in April 1922. There were 7,220 machines shipped by boat in May of this year, 2,381 in May of 1921, and 2,960 in April, 1922.

More Army Trucks Coming

Approximately 8,770 American-made army trucks are ready for return to the United States, 1,770 of them now in the hands of dealers in England (according to the British Liquidation and Disposal Board) which still remain to be sold and the balance in France. All, it is expected, will be dumped on the American market at prices far under the cost of new trucks of similar pattern. Half of the machines in France are said to be serviceable and in need of no reconditioning. The Graham resolution, if passed, would impose a 90 per cent. reimport tax on these machines, but members of the Senate finance committee have expressed themselves as of the opinion that there is no real need for the passage of the Graham anti-dumping bill.

Selden and Atlas Concerns Tied in New Merger Scheme

OTHER UNITS TO BE ACQUIRED LATER

Action of considerable interest to the motor truck industry is involved in the formation of the Industrial Motors Corporation under the laws of the State of Delaware. The new corporation is a holding company with an authorized capital of 1,000,000 shares of no par value, all of one class.

The announced purpose of the corporation is to acquire and hold the stocks, securities and properties of motor truck and accessory manufacturing and selling corporations and to manufacture and sell motor trucks and accessories. The first two units included in the new corporation are the Selden Truck Corporation, Rochester, New York, and the Atlas Truck Corporation, York, Pennsylvania. It is expected by the officers of the new corporation that other important units will rapidly be acquired.

The ultimate plans include the bringing together of the strength and coöperation of some of the principal manufacturers engaged in motor truck construction, thus providing means and methods of effecting economies in the purchasing of raw materials and supplies, lowering the cost of production and greatly increasing efficiency in manufacturing, merchandising and distribution. The great distributing economies which the plans of the new corporation will make possible are expected to offer advantages in service to truck purchasers and to increase the dealer's opportunities for better profits through more efficient selling.

The following directors and officers have been elected: Directors: John J. Watson, Jr., president, Lee Rubber & Tire Corporation; chairman of board, Martin-Parry Corporation, vice-president and treasurer, International Agricultural Corporation; Frederick M. Small, president, Martin-Parry Corporation; Reeve Schley, vice-president, Chase National Bank; George C. Gordon, president, and Robert H. Salmons, vice-president, Selden Truck Corporation; William A. Phillips, New York; George P. Smith, of Smith & Gallatin; Oscar L. Gubelman, of Knauth, Nachod & Kuhne; and Henry Hopkins, Jr., of Travis, Spence & Hopkins.

Officers: President and chairman of board, John J. Watson, Jr.; vice-presidents, George C. Gordon, Robert H. Salmons, Allan R. Cosgrove, and James R. Floyd; secretary and treasurer, Henry Hopkins, Jr.

The plan, it is understood, provides for 20,000 shares of new stock to be exchanged, two for one, for 60,000 shares of

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$190,000,000 Voted for Federal Roads in 1923-25

$16,250 AND $15,000 PER MILE LIMITS

Federal aid for road construction will be continued as a result of the authorization of additional appropriations for this work amounting to $190,000,000 carried by the Post Office appropriation bill signed by the President June 19. Fifty million dollars is authorized for the fiscal year beginning July 1 this year, and $65,000,000 and $75,000,000, respectively, are authorized for the two succeeding fiscal years. In addition, $6,500,000 is authorized for forest roads for each of the two fiscal years beginning July 1, 1923. The funds will be administered by the Secretary of Agriculture through the Bureau of Public Roads.

The apportionment to be made to the various states for the fiscal year ending 1923 is approximately as follows:

Alabama ...	$ 1,035,614	Nevada	$ 635,624
Arizona	702,188	N. Hamp...	243,750
Arkansas ..	836,095	New Jersey	628,581
California ..	1,641,399	New Mexico	793,216
Colorado ...	894,117	New York .	2,464,209
Connecticut	320,599	N. Carolina.	1,139,556
Delaware ..	243,750	N. Dakota..	776,476
Florida	591,217	Ohio	1,882,003
Georgia	1,331,972	Oklahoma .	1,168,226
Idaho	625,691	Oregon	788,443
Illinois	2,164,187	Penna.	2,265,969
Indiana	1,305,904	Rhode Is...	243,750
Iowa	1,401,915	S. Carolina.	707,492
Kansas	1,401,521	S. Dakota .	802,707
Kentucky ..	944,786	Tennessee..	1,098,461
Louisiana ..	664,660	Texas	2,950,115
Maine	463,440	Utah	566,278
Maryland ..	427,086	Vermont ..	243,750
Massachusetts	730,784	Virginia ...	971,219
Michigan ..	1,499,688	Washington	735,806
Minnesota ..	1,415,731	W. Virginia	534,906
Mississippi .	863,271	Wisconsin .	1,263,211
Missouri	1,632,086	Wyoming .	623,078
Montana ...	1,031,257		
Nebraska ..	1,054,126	Total	$48,750,000

These funds must be matched by the states and will be administered subject to the general provisions already in force.

The new legislation reduces the maximum participation on the part of the government from $20,000 to $16,250 per mile for roads constructed with the appropriation for the next fiscal year and $15,000 per mile thereafter. Bridges over 20 feet in span may be considered as separate projects to which this limitation does not apply. In states where more than 5 per cent. of the area is unappropriated public land provision is made for an increase in the amount per mile. The act also provides for the extension of federal aid to the building of structures required for the elimination of railroad grade-crossings.

Important provisions of previous acts under which large funds have been successfully administered are applicable to the new funds. States must maintain adequate highway departments. Funds to match federal aid must be placed under the direct control of the state highway department. The type of surface construction must be adequate for the traffic anticipated, with reasonable grades, curves, and other features. States must obligate themselves to maintain all federal-aid roads constructed, and in case this is not done any federal funds available for new projects may be withheld until they are put into satisfactory condition. All federal-aid funds must be spent on a connected system of roads consisting of not more than 7 per cent. of the total mileage in each state and divided into primary or interstate roads and secondary or intercounty roads.

Plans for the proposed system have been received by the Bureau of Public Roads from all but 8 states, and the state systems are being coördinated so that when joined together they will serve the best interests of the whole country. In the meantime only projects certain to be on the proposed system are being approved.

The new appropriation comes at a time when several states are nearing the limit of funds available. The authorization of funds for three years in advance will be of great benefit to all states in that it will permit them to lay their plans for some time ahead. Uncertainty as to future federal aid is removed and provision can be made at once for raising state funds to match it.

What the new funds will mean to the country can be judged by the use that has been made of the $350,000,000 previously appropriated. On May 31 17,000 miles of road had been completed, and, in addition nearly 14,500 miles were under construction. Federal-aid roads in all stages total nearly 38,700 miles, involving over $287,500,000 of federal aid. To match this fund the states have appropriated approximately $380,000,000, making a total of $667,500,000.

All types of road have been constructed with federal aid to meet the varying conditions in the United States. The average cost per mile has been $17,120, and federal aid has amounted to 43 per cent. of the total cost.

It is estimated that the $190,000,000 lately authorized will result in the construction of more than 25,000 miles, which added to the 46,000 miles that is expected to result from previous appropriations makes a total of 71,000 miles, or nearly 40 per cent. of the estimated 180,000 miles of road in system of federal-aid roads now being outlined.

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the Atlas stock; 60,000 shares exchanged, two for one, for 30,000 common shares of Selden; 24,000 shares exchanged, eight for one, for 3,000 shares of Selden first preferred; 80,000 shares exchanged, eight for one, for 10,000 shares of Selden second preferred. Twenty thousand shares of the balance are to be used for promotion.

May Kill 'Bus Traffic

A keen fight is in prospect, before the forthcoming session of the Texas Legislature, over a tax on motor trucks engaged in commercial traffic, and on 'buses operated for profit. Legislation, levying almost a prohibitive tax on these two classes of vehicles, has been drafted, it is reported, and will be offered to the lawmaking body. Steam transportation lines are said to be behind the move, which, if successful, will stop the use of the trucks for freight carrying between towns and drive out the 'buses, insofar as passenger travel is concerned. In the last year, each of these has gained in popularity and in general use in Texas.

Recovery of Motor Trade Forecasts General Revival

RUSSIA OFFERS BIG OPPORTUNITIES

"Reduced costs to the public in line with the fall of raw material costs account for the revival of the automobile industry above the normal business curve," said Charles Clifton, president of the National Automobile Chamber of Commerce, before the annual meeting of that body in New York on June 9.

"The record output of 252,000 cars and trucks in May, which exceeds by 32,000 the previous high record of March 1920, is evidence of the insistent public demand for efficient transportation. Never before have the models been so attractive, and never before have the prices been so attractive, thus permitting the public to get its full value immediately for the deflated dollar.

"This revival of a two billion dollar industry will strengthen general business conditions due to the demand which it makes upon copper, steel, aluminum, leather, lumber and other basic materials."

Julius H. Barnes, president of the Chamber of Commerce of the United States, addressing the meeting, predicted the prompt revival of business with a consequent increased need for motor transportation. He noted, as one reason why America can invest so heavily in motor vehicles, that the American family has to pay out only 40 per cent its income for food supply whereas the European pays 60 per cent.

Assuming a readjustment of economic conditions in Russia, that country should be an outstanding motor market, the market, the speaker indicated. "If in America the otherwise necessary expansion of railroads has been checked and replaced by the development of motor transport, and if in the test of competition, motor transport justifies itself against the steam railroad in new areas, then Ru sia, with its 200,000,000 people and its vast distances and its scanty railroad lines, offers a great field for motor development."

Charles Clifton (Pierce-Arrow) was reelected to the presidency, of the National Automobile Chamber of Commerce, the members insisting that he continue his long-time leadership in the industry. The directors reelected were as follows: Roy D. Chapin, (Hudson), C. C. Hancha, (Lexington), J. Walter Drake, (Hupp), H. H. Rice, (Cadillac), John N. Willys, (Willys-Overland). The following were elected officers for the year. Charles Clifton, president; Roy D. Chapin, vice-president; C. C. Hanch, second vice-president, passenger car division; Windsor T. White, second vice-president, motor truck division; A. J. Bresseau, secretary; H. H. Rice, Treasurer and Alfred Reeves, general manager.

C. H. Bliss has been appointed assistant sales manager of the Nash Motors Company. He succeeds W. W. Smith, who has been awarded the direct factory distributing contract at Oklahoma City. Mr. Bliss joined the Nash organization five years ago.

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April Exports Show Large Gain Over Preceding Month

TOTAL HIGHEST SINCE JANUARY, 1921

Figures of motor vehicle exports point to definite recovery in that department earlier than is generally supposed. Price changes in the past year have tended downward for low cost vehicles. But the total value of exports of vehicles has been at no time since as low as the $2,187,000 of July, 1921.

There follow truck and car exports for ten months beginning July and ending April, 1922 and 1921:

Ten months ended April 1922-21.	
April	$ 5,533,000
March	4,443,000
February	2,962,000
January	2,528,000
December	2,851,000
November	2,211,000
October	2,707,000
September	2,351,000
August	2,699,000
July	2,187,000
Total	$ 30,483,000
Ten months ended April, 1921-20.	
April	$ 3,743,000
March	3,226,000
February	5,117,000
January	9,409,000
December	15,235,000
November	20,078,000
October	18,724,000
September	15,585,000
August	17,164,000
July	19,654,000
Total	$126,942,000

Exports for ten months of the current fiscal year are down 75.1 per cent. from the value for the corresponding period a year ago, with an even greater decline from two years ago. Quantity decrease was from 96,705 vehicles to 35,331, or 63.2 per cent.

Shipments since July have improved rapidly without any real setback in the upward swing to value of April, 1922, exports is the highest since January, 1921. It is a third above April, 1921. The gain in the number of vehicles has been over 100 per cent. In one month, or since March, 1922, the increase in value has been a fifth and in number over a fourth. Exports of the later ten months are 15,000 and $10,000,000 above corresponding period eight years ago.

The largest April gains were in exports to Canada and Australia. In the number of motor trucks Mexico led with 889, but the value, $564,656, was just half the amount paid by Canada for 807 trucks. Japan imported 640 American trucks, United Kingdom 807, Australia 438, the Netherlands 266.

France in 1920 fiscal year imported 1,392 motor trucks and 839 passenger cars; in 1921 7 trucks and 339 cars.

White Business in May

The White Motor Company directors, at their meeting on June 9, declared the regular quarterly dividend of $1.00 per share payable June 30, to stockholders of record at the close of business June 20, 1922. Loans have been reduced to $1,700,000, with no customers' notes discounted, as against $3,600,000 on December 31, 1921, and cash increased in the same period over $1,250,000. The earnings for the past two months have been at a rate more than sufficient to meet the regular dividend requirements, and current conditions indicate a prosperous year.

Commenting on the business, Walter C. White, president of the company, stated that orders in May exceeded the 1,000 mark, and deliveries showed a substantial increase over April, with every indication of a total business for the year of approximately 9,000 trucks. Factory production continues to increase, and there are now over 3,000 men employed, compared with about 2,000 at the beginning of the year.

"Autocar" Name Upheld

The right of the Autocar Company, of Ardmore, Pennsylvania, to the exclusive use of the word "Autocar" in the manufacture and sale of motor vehicles and parts thereof has been upheld by an injunction issued for the District Court of the United States for the Eastern District of Pennsylvania on May 23rd against the Peters Autocar Company, and DeVellier & Company, Inc., who advertised securities for sale in which they made use of the word "Autocar."

The Autocar Company was established in 1897 and has used the dsignation "Autocar" exclusively to distinguish its product. This injunction is a legal confirmation of general practice both in the automotive industry and among the public at large to consider the word "Autocar" as meaning exclusively the motor trucks which have been manufactured for many years by the Autocar Company.

Kelly Advances Pietsch

E. O. McDonnell has resigned as general manager and vice-president of the Kelly-Springfield Motor Truck Company of Springfield, Ohio, and Frank H. Pietsch succeeds him. Pearl A. Lewis has been named as assistant general manager. He has been associated with the company for years. Mr. Pietsch, formerly of Chicago, joined the Kelly force several months ago as general sales manager.

	April, 1922. (No.)	April, 1922. (Value.)	March, 1922. (No.)	March, 1922. (Value.)	April, 1922. (No.)	April, 1922. (Value.)
Motor Trucks and 'Buses.						
Up to 1 ton	580	$ 234,455	366	$ 184,797	.....	.....
1 to 2½ tons	226	273,907	173	248,865	.....	.....
Over 2½ tons	73	166,385	57	120,630	.....	.....
Total	879	$ 674,747	590	$ 554,292	609	$ 811,841
Passenger-Cars.						
Up to $800	4,023	$1,670,297	2,573	$1,426,837	.....	.....
$800 to $2,000	2,212	2,506,904	1,732	1,902,007	.....	.....
Over $2,000	.....	645,536	166	502,588	.....	.....
Total	6,438	$4,822,737	4,471	$3,831,432	2,469	$2,931,235
Miscellaneous.						
Electric cars and trucks	20	$ 35,791	41	$ 57,884	.....	.....
Industrial trucks	5	2,339	19	30,651	58	18,469
Parts of cars and trucks except engines and tires	.....	3,933,488	.....	.....	.....	3,195,698
Trailers	15	6,198	125	51,455	.....	.....

May Production Reaches 252,000 Trucks and Cars

BIGGEST MONTH IN TRADE'S HISTORY

Nothing more clearly indicates the increasing demand for the transportation of persons and merchandise than the record production of motor trucks and cars as reported to the annual meeting of the National Automobile Chamber of Commerce June 9. The May shipments, with a few companies still to be heard from, were in excess of 252,000 trucks and cars, an increase of 53 per cent over May of last year and 15 per cent over April of this year. The heaviest previous production in the industry was 220,000 in the month of March 1920.

Reports received at the meeting, attended by more than one hundred motor vehicle manufacturers and presided over by President Charles Clifton, showed an increasing demand for motors in practically every part of the country except Maine and Georgia. Many of the agricultural states are showing substantial increases over last year with excellent prospects in June for trucks and cars.

It was shown that the April exports of cars gained more than 49 per cent over March, while the exports of trucks increased 44 per cent. These products went to 114 different countries.

The meeting discussed a broadening of campaigns for the prevention of accidents, more stardardization that will make for lower production costs, continued research in motor fuel matters, standardized and better service for users, a demand for stronger enforcement of motor vehicle laws in preference to putting more laws on the books, and plans for assuring efficient expenditure of highway funds.

The meeting was addressed by Julius H. Barnes, president of the Chamber of Commerce of United States, on "Transport and Human Progress."

May Motorize Milk Distribution

Organized milk producers of the country have issued an ultimatum to the railroads to reduce freight rates or compete against a national motor transport. A delegation of the National Milk Producers' Federation and representatives of the American Farm Bureau in Washington have asked the Interstate Commerce Commission for a hearing before final steps were taken for the establishment of a motorized system of distribution.

The commission has been asked to take the passenger rate from milk and make freight rates apply, in order that the 200,000 milk producers may receive the benefit of the recent 10 per cent. freight reduction. Unless the commission permits milk to be transported on the basis of freight rates, instead of the present passenger rates, the railroads will lose practically their entire short-haul transportation of milk, which will be taken over and handled by the motor transport, the commission was told.

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The engineers who are building American-LaFrance Commercial Trucks have established a wonderful record of accomplishment.

It is significant that this record has been established in the field which calls for the sturdiest type of construction—the fire apparatus field.

In the 90% of American cities which use American-LaFrance Motor Driven Fire Apparatus it has never failed to give satisfactory performance even under the most trying conditions.

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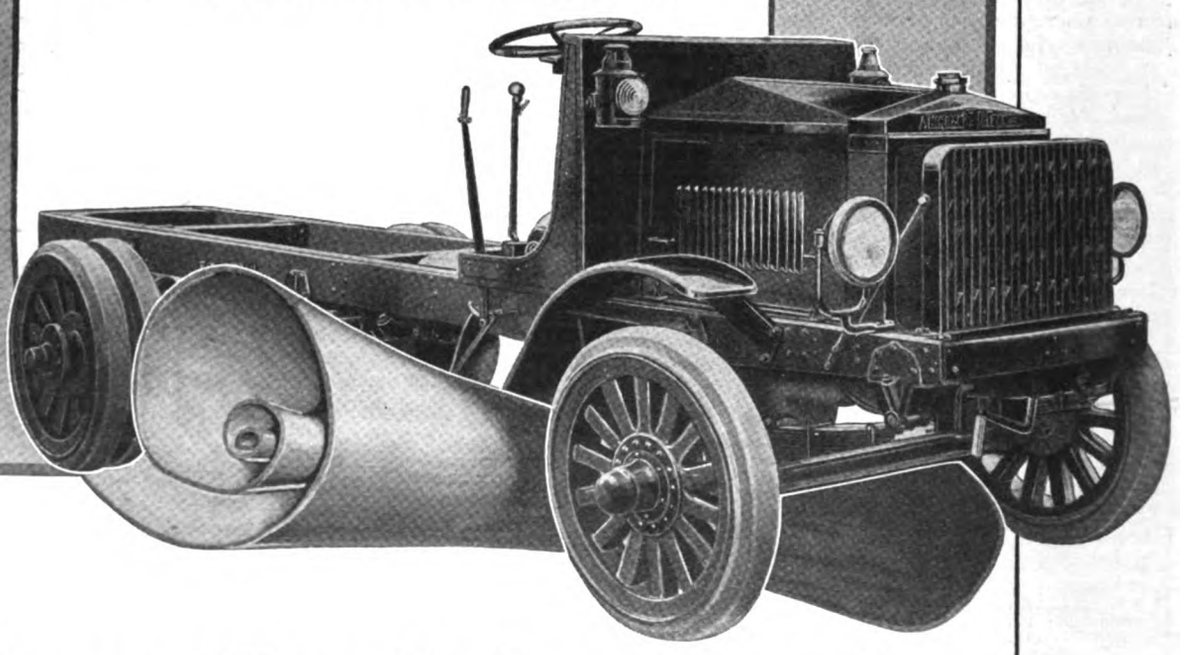

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

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Save the Good Dealer

NEVER in the last few years have we talked with a reputable truck dealer in New York, Chicago or Cleveland—or in any other large city for that matter—without his complaining bitterly of the increasing difficulty of conducting operations on a business-like basis and of the practical impossibility of realizing even a meager profit from truck sales. Were reports of this nature confined to a few concerns or were they limited to certain districts or seasons, the explanation might be sought in individual method, manufacturer or dealer reputation, special conditions of market, or other factors of purely local significance. But they are general and, one can truthfully say, open to no exceptions of importance. It is the common cry of men long trained in the industry that, by and large, there is no profit in truck selling under the oppressive competition that prevails to-day and has existed for a period of years.

For an ailment so universal in extent and so uniform in its symptoms a more general cause must be found and, indeed, it is not far to seek. Where the market possibilities for truck selling can be definitely ascertained and it is demonstrable that there are several times as many sellers as can possibly hope to thrive out of the needs of present and potential buyers, it is pretty evident that the fabric of distribution has been stretched to the point where the sound fibers are carrying the weight of the shoddy in addition to the normal load of industry and that a break is inevitable. There is certainly something unwholesome in a system that can not insure a livelihood to even the most conservative of its members; there is either too little business going around or there are too many people endeavoring to share it; and the obvious remedy is either to increase the amount of business or to reduce the number of those who are dependent on it. But since you can not expand the truck market indefinitely, since the demand for trucks is in proportion to the needs of commerce and its ability to supply those needs—all theories of the "ginger" specialist to the contrary notwithstanding—the unfit, the ravagers, the dead weight must be eliminated, unless the sound element of industry is to be submerged in the downfall of the weak. The water in the dealer system must be wrung out, and that promptly, if the process of dissolution is not to go on unchecked.

As far as our knowledge goes, there is not a city of any importance in the country where the number of dealers contending for truck business is not vastly greater than it should be, considering the market's possibilities. Can there be room for 18 truck dealers, we ask, in a city of 75,000 persons, where half of the people are women, one-half of the remainder minors, a fifth of the rest foreign-born, and nearly a third of the balance colored—in short, can one truck dealer live out of the truck transport needs of 469 American-born white families? Yet Peoria in Illinois is such a city. Can 36 truck dealers survive in a population of 115,000, where there is one truck dealer for every 389 American-born white families, as in Norfolk, which has more truck dealers than Cleveland and less than one-sixth as many people? Newark, to take another example, has as many truck dealers as Philadelphia and not one-fourth the latter's population. Atlanta has more truck dealers than St. Louis yet not one-third the population to draw from. And the lower one goes in the scale of population the greater is the disparity between the number of truck dealers struggling for business and the amount of business to be had—the smaller the town, that is, the greater the number of dealers per unit of population.

And precisely in that fact does one find the cause of this industry's sorest pains. Out of this frightful and most unbusiness-like situation arise the aggravating methods, the disreputable practices, the vile forms of competition that make the commercial life of the reputable dealer so harrassing and precarious. The worth-while dealer—the one who has the power, mental and financial, to make the truck industry's future secure and profitable for the truck maker of his own kind—stands on the brink of ruin because of the unobstructed ravages of the parasites who swarm around him—men who cling to a business for which they are utterly unfitted, as regards temperament, mentality, means and everything else, and who seek, through the desperation born of their own hopeless condition, to appropriate the profits that belong to those who, through courage, foresight and pioneering effort during many long and lean years, have put the truck business on a firm foundation. If the good element is not saved by the aid of the solid body of manufacturers, the fabric of distribution must inevitably break down, and when that time arrives even fools will be able to predict the outcome.

Dangerous Propaganda

IN SPITE of the rigorous hardships suffered during the last two years and even now, because of its policy of accepting at face value the chimerical estimates of truck sale possibilities offered by unscrupulous and uninformed chatterers, this industry runs no small chance of committing the same follies that have characterized its history up to date. On every hand we hear the most fanciful statements of probable truck output in 1922 and, judging by the glibness with which these utterly fatuous statements are handed about by otherwise intelligent men, they are having their effect in the quarters where they can work the greatest mischief.

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Truck output this year will reach 300,000 units, we are told by some; the lowest estimate we have seen places the number at 250,000 and there have been others higher than the figure first named. What we are tempted to ask in this connection is this: Does anyone of sound judgment care to defend these figures? Does any man, who has lived through the last decade of truck manufacture and sale, wish to court open ridicule by voicing or even cherishing a belief in the possibility of anything so fantastic? Or, if he is too astute to be misled by such puerile drivel, will he contend for the usefulness in an industrial sense of a policy that will countenance or approve the dissemination of such fanciful statements?

Now, everyone familiar with the market for trucks and the present state of business must know that truck production this year can not reach even the lowest of the estimates that are going the rounds of the trade. Where is the demand to be found and where the needed purchase-money? Where, in even the most optimistic view of the matter, can buyers be found for 70 to 100 per cent. more trucks than the country was able to absorb in 1921? Is business in general so much better; is the purchasing power of the dollar so much enhanced; is the public demand for goods of all kinds so much larger than a year ago?

We are less concerned about the effects of such misinformation on the sound element of the industry than about those on the unstable and hysterical element. The former's natural conservatism—the quality that has made for firmness and strength—may be relied upon to withstand the attacks of wildness; but among the latter, most of whom are in this business simply because of their inability to understand its nature, to visualize its difficulties and to analyze its possibilities—among such no depth of judgment or nicety of discrimination can be looked for. It is in this group, indeed, that the seed of deception finds most fertile soil. "Boom" statistics breed "boom" expectations and these, in turn, breed "boom" manufacture and "boom" distribution—two evils that have produced the volume and character of competition so hateful to the conservative maker and dealer and of which the industry has had more than enough. How can we hope to prevent the influx of new makers and dealers in an industry badly overcrowded—to say nothing of the need for reducing the number of those already in it—if we allow the dimensions of this business to be distorted and its possibilities to be exaggerated? How can we hope to build for soundness and permanence while talking the language of instability and temporariness? It has not yet been done, and we are strongly of the opinion that it will never be done.

Friendship of the Railways

THE railways are beginning to take a more kindly view of motor transport, we are told, and as evidence *vide* the recent purchases by them of motor 'buses and other motor equipment. We are not to think for one moment, of course, that these tardy acknowledgments of the machine's merits are anything but signs of an altruistic spirit, which is intent on seeing the automotive industry prosper at all costs, even to the disadvantage of railway earnings.

While the industry must be thankful for this manifestation of good feeling on the part of the railways, we are just skeptical enough to believe that these purchases are dictated by sheer necessity and that the conversion of railway men to the motor vehicle will be quite as difficult and slow a process as that of the professional horse operator, while the development of independent motor competition will be obstructed in every way that railway lawyers and lawmakers can devise. In every state where motor competition has become of consequence the railroads have adopted the most belligerent attitude in dealing with it, and one can reasonably believe that these moves are not mere gestures calculated to inspire awe and fear in the venturesome, but part of a concerted plan to stifle the progress of all conflicting types of transport.

"I am opposed to these transportation agencies [motor trucks and 'buses] as competitors of the electric railway interurban," said Harry Reid, president of the Interstate Public Service Company, at the recent convention of electric railway men, and the applause that greeted this remark is a sure index of the extent of feeling on the subject, "and I feel that they should be disposed of by legislation which would result in the regulation of their business by public service commissions . . . and I come to this conclusion believing that our interurban business, to be successful, must operate as a natural monopoly . . . . . In addition to regulation, the 'bus or truck should pay a special license tax, not only as a compensation for the damage done to the roads which the interurban helped to build, but also as an offset to special tax burdens placed upon the interurban industry." And "to regulate street and interurban railways and impose heavy taxes upon them," said Robert I. Todd, president of the American Electric Railway Association, on the same occasion, "while permitting motor 'buses to run at large unrestricted and practically free from taxation, is manifestly unfair and is bound to break down city transportation. . . . There may be a legitimate use for motor 'buses as an adjunct to electric railway transportation, but they should be under the direction and control of railway companies."

Motor trucks and 'buses engaged in public service are viewed with alarm by railway owners, not because they threaten their investments, but because they reduce the earning capacity of those investments by diverting traffic from the rails to the roads. While railways may purchase motor equipment in limited quantities for what they call "experimental" purposes, this must not be mistaken for a sign of conversion to motor transport and of an intention to withdraw opposition to the growth of that form of haulage. Railways are unwilling to invest heavily in motor vehicles (which do not in any way augment the earnings of roadbed and rolling-stock already in existence) and, such being their position, they are also unwilling that others, not hampered by similar burdensome and weakening investments, should reap any reward from the ability and desire to furnish the public with a superior type of service.

The situation is one that will bear repeated mention, lest we forget that the two forms of haulage are in open conflict in certain fields, and that the railroads' attitude is one of deep-seated hostility in spite of friendly statements to the contrary.

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Production Increased by Training Unskilled Men

PLAN REDUCES THE LABOR TURNOVER

The automotive industry, by the simple expedient of training unskilled laborers in special machine operation, is through a trying period of skilled help shortage. "Pirating" of help by one factory from another has practically ceased and wages have not been forced up beyond reason, according to a survey of the situation in Detroit. As a result many men have been raised from common labor at 30 to 40 cents an hour to the semi-skilled class at 55 to 60 cents an hour. They have, in effect, learned a trade and increased their income.

When the demand for machines returned with a rush in January and February motor executives, noting a tendency toward increased labor turnover, set out to find a cure. It was suggested that the larger plants establish some sort of training school in which men without experience as skilled machine operators could be taught one particular machine operation. Tried in a small way the plan showed immediate results. New men are taken into plants at night and with machines slowed down are taught specialized work. By performing one operation over and over the "green" men soon become expert in that particular activity and are just as useful as men skilled in a wider range of machine operation. These operatives are called "specialists" and comprise, in the opinion of J. L. Lovett, manager of the Michigan Manufacturers Association, the largest class of workers in the automobile industry today.

The general level of motor factory wages is about 15 per cent. under the peak level obtaining during 1920 and from 5 to 10 per cent. above the level of January 1, 1922. Common labor is receiving from 40 to 45 cents an hour, compared with 60 to 65 cents at the peak of 1920 expansion and with as low as 30 cents during dull times last winter. Tool makers range on the average between 75 and 90 cents an hour, compared with $1.25 at the peak and as low as 60 cents an hour last winter. Machine specialists range from 55 to 60 cents an hour compared with 75 to 80 cents an hour in 1920 and with 45 to 50 cents six months ago.

Workers in the latter class are not limited to earnings based on these rates. Some plants designate a certain number of nuts, bolts or other pieces of machine output as a normal day's work and pay a bonus if the day's output exceeds this quota. To this extent the arrangement partakes of the piecework plan, but it does not follow it in other respects. A worker is sure of his normal day's wages and extras if he feels inclined to speed up.

Another result of the training school has been a rapid depletion in the ranks of unemployed common laborers. Employers say there is no opening in Detroit for the "floater," but that laborers willing to learn specialized operation can be readily placed. Saginaw recently imported 150 molders from the east and is looking for other skilled help. Body painters are wanted. The situation in short is that, by intelligent handling of a limited supply of help, 1920 mistakes are being avoided, men are earning as much per week as formerly because they lose no time in changing jobs and, in Mr. Lovett's opinion, there has been reached in the employment situation a stability heretofore unknown in the industry.

The following tabulation compares the average wage rates in cents per hour at present with the 1920 peak and January, 1922, for the three principal classes of workers in the industry:

	At Present.	1920 Peak.	January 1922.
Common labor	40-45	60-65	30
Tool makers and similar skilled workers	75-90	1.25	60-65
Machine specialists .	55-60	75-80	50

There is conviction in some quarters that the training school has gone a long way toward solving the traditional difficulty of obtaining sufficient skilled help during rush times. It is hoped that by coöperation with city officials men released during the dull manufacturing periods can be given employment in public works, the common laborer thus becoming a machine specialist when he is needed in the motor plants and returning to construction work when the industry passes through the dull seasons.

It is notable that instead of living in Detroit rooming houses six or seven months during the year and returning to the farms the remainder of the year many workers are building homes in the new outlying sections. Radiating in almost every direction are hundreds of miles of new concrete roads along which the men build houses costing from $750 to $1,500 and then "commute" to work in their "flivvers." Toward Pontiac along the new Livernois highway opened up by the municipal car lines more than 1,000 such houses have been built since January of this year.

Mack Earnings Rise

The earnings of Mack Trucks, Inc. in April were in excess of $400,000, an increase of more than $100,000 over March. Net profits totaled $255,197 after depreciation in the first quarter, compared with $4,395 in the corresponding quarter of 1921.

March net earnings absorbed the slight customary seasonal loss in January and February, and left a profit for the first three months of this year equal to the quarterly disbursements on the combined $16,252,891 7 per cent. first and second preferred stock. March earnings alone were at a rate more than three times in excess of the annual preferred dividend requirements.

To-day the company is earning at the annual rate of about $10 a share on the 283,108 shares of common stock.

Last year earnings were equal to $1.16 a share on the $10,921,891,790 first preferred stock. If production is maintained at the present rate Mack should turn out about 5,000 trucks this year. It has plant and working capital to accomodate a production of 10,000 to 12,000 annually.

The working capital is in excess of $18,000,000. Inventories were written down to rock bottom at the end of 1921. An additional $300,000 was appropriated to cover a possible further shrinkage. The company now has an appreciation on inventory.

Engineer Marks Field of 'Buses in New York City

FOUR PRACTICAL FORMS OF ACTIVITY

There are at least four ways in which 'buses may become a useful part of the transportation scheme in New York City in the opinion of Daniel L. Turner, consulting engineer of the Transit Commission of New York, speaking before the truck manufacturers of the National Automobile Chamber of Commerce in New York June 9. He suggested that 'buses be used for special route service for segregated groups, cross-town service, accommodation of short-haul traffic in congested areas in place of surface lines, and for auxiliary work to the present subway and elevated lines in the development of the outlying areas of the city. Inasmuch as the Transit Commission has not made public its plan for using 'buses in its general transit scheme, Mr. Turner's unofficial remarks are considered therefore of special significance.

"There are at least four ways," said Mr. Turner, "I believe, in which 'buses may become a useful element in the transportation scheme of New York. But in every case their use would be as a supplement to the existing services, not as a general substitute for such services. First, 'buses may be used to furnish a special route service. I am not now referring to sight-seeing 'buses, excursion 'buses, or any type of incidental special service. I mean an everyday service of a special character for regular customers. Regular through-route special service workward in the morning and homeward at night can be furnished for segregated groups of patrons. Secondly, New York needs more cross-town or circumferential routes in order better to articulate the traffic carried on the workward and homeward lines. Cross-town routes are relatively short. This is particularly so in Manhattan. Such a service, where possible without conflicting with the prior or controlling franchise rights of the surface lines, can be furnished better by 'buses than in any other way. Thirdly, 'buses can be used to some extent to accommodate the short-haul traffic in the congested centers in place of the surface-car lines. This would not mean a general elimination of the surface-cars and a substitution of 'buses, but the use of 'buses in place of cars only when and where excessive vehicular congestion requires it. Fourthly and the most important of all the uses mentioned, the 'bus should be utilized as an important auxiliary to our subway and elevated lines in developing the outlying areas of the city. Of course, the subway and elevated lines—the rapid transit lines—must provide the long haul from such outlying areas to the center. But to depend entirely upon the rapid transit lines for this service would mean an inordinate expenditure of money."

Mack Trucks, Inc., formerly the International Motor Truck Company, declared the regular quarterly dividends of $1.75 a share on both first and second preferred stocks, payable July 1 to stock of record June 20.

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Conditions Point to Good Future Business in South

ACTIVE MERCHANDISING WILL SUCCEED

Alfred H. Bartsch, general sales manager of the American Bosch Magneto Coporation, has just returned from a six weeks' circuit of the eastern and southern states, having visited 33 leading cities in that time. The trip was made for the purpose of investigating general conditions and studying their probable effect on automotive sales during the next six months. Mr. Bartsch found the south to be very "spotty" in so far as general business is concerned. Motor vehicles were selling well in some places and not well at all in others; for instance, in Virginia at least 30 per cent of the machines in that state up to the time of his visit had not been reregistered. They were standing idle because of lack of funds. The same situation held in South Carolina and in Georgia.

The unusual situation referred to was evidenced when he visited a town like Winston-Salem, North Carolina, and found, for instance, that certain distributers were sold out and were after more vehicles, while business in Savannah was very quiet; as a matter of fact, five or six banks had closed during the past six months. In North Carolina many textile factories were working overtime, while those cities which depended upon farm trade for their support were doing very little business.

Conditions in North Carolina and Florida are, at the present time, better than in other states in the south. North Carolina looks good from a future point of view, as does Florida, but both states can be included in that circle of hesitation which circumscribes the entire South. However, while previously not listening to sales talks or merchandising efforts, there now exists a more receptive state of mind.

The present difficulty, if it can be called such, is due to some extent to the enormous amount of unpaid bills and the refusal of banks to accept out-of-town paper which, of course, is quite natural. The fact that the farmers as a whole lost practically all the money they had because of the drop in price of their products is the basic cause for the backward condition of the eastern southern territory. There naturally exists, too, a large amount of unpaid loans to farmers who will of necessity hold off until the next crop comes through and until they know definitely the prices they are to secure.

Cotton possibilities looked fair with a possibility of improvement from a price point of view, as it seems as though there would be a definite shortage through the entire South. This, of course, will cause a rise in price of this commodity sooner or later. To bring the supply of America back to that of last year we shall have to raise 12,600,000 bales—better than 50 per cent increase over 1920-21—but this can not happen this year. From this it would seem that next year will be a banner year in the South and it is desirable to plan sales accordingly.

Up to the time of Mr. Bartsch's visit there had been a general shortage of rain in South Carolina. In fact, no rain had fallen in Florida for two months, so this state, while generally good territory for sales directly after the tourist season had closed, has turned to one of conservatism on account of the drought. However, it can be said that conditions are definitely improving and, with personal and intensive merchandising activities, a fair amount of business can be secured. After September the southeast should improve materially. North Carolina and Birmingham, Alabama, are rapidly improving.

The central south has naturally been materially affected by the flood situation in the Mississippi Valley. Unlike Florida, there has been an excessive amount of rain and it had been impossible to plant crops of any nature. It seems, however, that the flood subsided just in the nick of time for the planting of cotton, thereby greatly brightening the outlook throughout the valley. The possibilities of a cotton shortage and improvement in the weather, the central south ought to prove fairly good for the automotive business. Already the cotton shortage has caused an increase in the price of stored cotton in Alabama, Mississippe and Southern Tennessee.

In the north central district, surrounding St. Louis, the coal strike has materially affected trade and business is not as good as one might expect. Naturally, the reaction caused by the flood in the section south of St. Louis has slowed up business for the entire section, but that will be temporary.

In the Chicago territory, in the southwest and in the central west, spring has been about two months behind and has been the cause of a drop in business, which usual ly "peaks-up" in March and April. A late spring has also retarded business in the Ohio territory, but good business can be expected in this district from now on, increasing as the farmers become more and more optimistic, as they undoubtedly will, and provided of course that they secure good crops and good prices.

Mr. Bartsch noticed a particularly intensive activity on the part of "gyp" battery and tire manufacturers in the west and middle west, an activity that bids for the attention of the so-called legitimate manufacturers. Generally speaking, however, there is a definite lack of pessimism and a general looking up, which suggests that the near future, while it can not be considered excellent, will be from fair to good and, with intensive merchandising, sales ought to be somewhat better than last year.

Ward LaFrance Revived

The Ward LaFrance Truck Corporation, Elmira, New York, has been sold by the receivers to Walker Motors, Inc., New York City, pending confirmation by the court. R. W. Walker, head of the New York company, was formerly sales manager for the Hurlburt Motor Truck Company, and later identified with the receivership of the latter company. It is planned to move the Ward LaFrance plant to New York and manufacture for the local market a truck very similar to the Elmira product. The deal in no way concerns the American-LaFrance Fire Engine Company, Inc., also of Elmira, the manufacturer of fire engines.

Agricultural Inquiry Body Urges Transport Institute

EXISTING FACILITIES MUST BE STUDIED

The Joint Commission of Agricutural Inquiry in its report on transportation will recommend "the establishment of a private research and educational institution under disinterested auspices for the purpose of promoting education in the principles, operation and practices incident to transportation."

Sydney Anderson, chairman of the commission, discussing this recommendation, said: "There are approximately $50,000,000,000 invested in transportation in this country, including steam railways, electric railways, highways, automobiles, motor trucks, waterways and shipping. These agencies of transportation, which should function as a coördinated system in the aid of commerce, have come into existence without relationship to transportation facilities already existing. There is no agency through which the basis of fact and principle necessary for the coördination of these transportation facilities, so as to give the most efficient service at the lowest cost, can be secured. There is no place to-day where the business of transportation can be learned except in the apprenticeship of the business itself. An institution such as the commission suggests would furnish a means of definitely establishing the facts and principles of transportation upon which sound decisions respecting transportation policies can be predicated; the relationship of the different agencies of transportation to each other, and the relationship of these agencies to agriculture, industry, trade and commerce. It would also furnish a means for the dissemination of education in the principles, operation and practices incident to transportation."

Mr. Anderson further said in discussing this recommendation, "I understand that the organization of a National Transportation Institute is under way, and I believe that the organization of such an institute should and will deserve the coöperation and support not only of the transportation agencies, but of the people generally who use these agencies and are primarily interested in the services which they render."

Stewart Prices Down

The Stewart Motor Corporation, Buffalo, has made price cuts ranging from $150 to $660 on its line of motor trucks. In addition the wheel-base of the Utility Wagon, Model 14, has been increased by five inches, from 123 to 128. Tire sizes on this model all around have been increased from 32x4½ to 34x4½. The comparative table of new and old prices, together with the net change, is as follows:

Model	Capacity, tons	New price	Old price	Change
14	1¼	$1,245	$1,395	$150
15	1½	1,445	1,875	430
9	2	1,790	2,200	410
7	2½	2,190	2,800	610
7X	3	2,390	2,950	560
10	4	3,190	3,850	660

F. C. Dumaine, treasurer of the Amoskeag Manufacturing Company, has been elected a director of Mack Trucks, Inc., succeeding E. R. Hewitt, resigned.

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Planning a Motor 'Bus Service

By F. PICK

Assistant Managing Director, London General Omnibus Company

THE first step to the establishment of an omnibus company is a methodical survey of the district to be served. In this the points of inquiry may broadly be classified under three aspects, namely, (1) considerations affecting receipts, (2) those affecting outgoings, and (3) those affecting the working.

In the same class a difference should be noted between the causes that tend to compel movement, and those which tend to encourage it; in other words, between necessary travel and that which, though not absolutely inevitable, is desirable for betterment or pleasure.

Points governing the former aspect are: (1) number and distribution of population; (2) occupations of population, and whether any appreciable distance in general separates homes from the working places; and (3) trade of the district, and whether market and shopping centers are at any appreciable distance from the residential parts.

Factors governing the second point are: (4) educational facilities of the district; (5) habits and amusements of the population; and (6) natural and historical attractions of the locality. A considerable traffic can, by advertisement, be built up on local sports, beanfeasts, and similar occasions, so long as there is a predisposition to amusements of this sort. The more stimuli there are to travel, the more considerable will the traffic be. As an example of this, in an undisurbed rural district the number of journeys per head of popudation must be less than 50 a year, while in a metropolitan area the number is about 400 in the year. The difference is one of interest—the mere size of the place compels movement—but it is also one of opportunity.

A factor in this survey which governs both essential and non-essential traveling is (7) the distribution of wealth and average income of the population. The upper and middle working classes afford the best field for the development of motor omnibus traffic; a prosperous industrial community is the likeliest to insure success.

Points more particularly affecting the outgoings are (8) the existing means of transport in the district, and the extent to which a prospective omnibus service will be merely supplementary or competitive: (9) the character, strength and stability of the roads of the district and their prospect of speedy improvement if used for heavy motor traffic. In considering the former it must be recognized that the omnibus is essentially supplementary to railways, and coordination, tending to security of position and efficiency of operation, is always the wisest policy.

Finally, the survey should include a study of (10) local regulations governing motor transport. There is a tendency to be afraid of regulations, but if they are made not for the sake of regulating but to secure the interests of the public, if their objects are good, and they are equitably enforced without arbitrary or irregular action, they can only be helpful to an omnibus undertaking. A code of by-laws similar in substance to those governing railways and street-car lines, for example, could not fail to be advantageous.

But a survey like this must be dynamic not static. It should be a survey of the population in motion, not for a single day or a single season, or even a single year, but over a series of years, forecasting the chances under each factor of that motion becoming more intense, more lively. Moreover, the survey must be flexible: It should be prepared for the checking and correction of errors so that it may be kept up-to-date.

To satisfy the requirements of a district involves four distinct questions: First, the routes to be worked; second, the services to be run; third, the vehicles to be employed; and fourth, the fares to be charged. The questions arise naturally in this order, and are discussed in turn.

A route connects a series of traffic points, and its value largely depends on the number and importance of these traffic points. In the country they are naturally constituted by villages or clusters of houses, but these are not always on the main road. The Malton road in Yorkshire, for instance, runs for 18 miles without more than an odd house or so at intervals, the villages lying a mile or more away to either side. The Staines road from Hounslow affords another example, with only the single village of Bedfont in a distance of 7 miles, though to the south are the larger villages of Ashford and Feltham, which, thanks to their railway stations, tend to become more important centers. The straightest route is not always the most remunerative or the most convenient to the public: experience bids the layer-out of routes not to be afraid of detours to reach the real traffic points. Omnibuses should deal with local rather than through traffic, and passengers from A to Z should not be expedited at the expenses of passengers from A to C or C to E.

TRAFFIC points in towns and cities are sometimes more difficult to determine, because they tend to the more customary and the less natural, but this side of the problem is considerably dependent on the settlement of fares, with which it must be further considered.

But when a route is chosen topographically, the operating considerations influence its length. There are two aspects to this. The one relates to the flow of traffic. Unless starting from a market place, railway-station, or other exceptional concentrated point, traffic averages light for some distance until sufficient passengers can be picked up to make an average load. Again, unless the finishing point represents some traffic center, the load tends to dwindle as it is approached. Therefore to secure a fair average load the route should contain a good middle portion. But a route must not be too long. Moreover, it should be fairly uniform in character, and not pass suddenly from one class of district to another, if it is to be easily and evenly worked.

The second factor in the operating problem is the human element represented by the driver and conductor. Happily this stringency governs the length of route, for the men require an interval not only for meals, but as a break in the strain of work; also presumably, the 8-hour day will dominate conditions, though this must mean 8 working hours, and not merely 8 continuous hours, if traffic is to be worked satisfactorily.

ALL things considered, the best length of route, therefore, seems one giving 3 or 4 round trips in a working day. This affords for human needs sufficient intervals in the lay-over times between trips. Certainly no route should be so long as to give less than two round trips. In Greater London route lengths range from 2 to 25 miles, but the average is 11½ miles on week-days, 12½ on Sundays, the most economical distances being 15, 10 and 6½ miles according to the number of round trips.

Speed obviously has an important influence on the distance traversible in a given time. With the maximum legal limit for omnibuses at present 12 miles per hour, the actual average speed varies just over 11 miles per hour in open country down to 7 in congested city streets, and so country routes on the average are naturally somewhat longer than in the metropolis. In a typical all-country system the average route length is 14½ miles, with extremes ranging from 6 to 27 miles, the most economical lengths being 18, 12, and 8 according to round trips.

With the prospect of the legal speed for omnibuses being increased to 16 miles per hour, with 20 miles per hour for a lighter class on pneumatic tires, there is the likelihood of the network of routes being spread over a wider field from any given center

There is need for framing in the light of current labor conditions a standard of what constitutes the ideal length of route, so that meal relief may be secured without delay or disturbance to the traffic, and the least amount of working time cut to waste in the lay-overs at the terminals. There are several solutions to the problem, and the best to meet each set of circumstances should be chosen, but it is good to have a standard by which to measure the result, even if that standard is only hypothetical. Every schedule should therefore be tested statistically against this ideal measure, and its percentage of efficiency recorded.

An omnibus route in an urban area can be branched like a river to serve through its main stream two or three tributaries, and

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thus bring its services more closely to the point desired. This is of special advantage in facilitating adjustment of services. Still, it does not always hold. For example, take the Romford road through Bow, Stratford and Ilford covered by Route 25, Victoria to Seven Kings, and compare it with the Barking, Route 2, Canning Town and East Ham, which is covered by three routes with interrelated services. Yet in the last-named case the results are not as good, although the routes spreading over the City and Central London would seem to offer the better traffic inducements. This is an isolated comparison, but reveals the complication of traffic operation.

It is wise not to vary a route too frequently; it takes a year or more to establish a regular flow of traffic. The route first tried may not prove the best, but changing it for the satisfaction of proving this point may be more expensive than being content with something less for the remainder of the season. Changes there must be, but they should be held up until the opening of a new season, and then dealt with all at once so that ample and clear notice of change can be given.

There are two possible main types of service, the one an interval service, as in common in Greater London, the other a time-table service, as commonly worked in country districts.

On interval services in Greater London the "headway" or interval between each vehicle ranges from about 1 to 60 minutes, but the average is about 4, and the normal range between 2 and 8 minutes. When the interval amounts to 10 minutes or more, regular passengers are inclined to catch particular vehicles rather than wait to take the first that happens to come along, and so, under such conditions, some attempt should be made to insure the 'bus touching motor traffic points, especially on outlying parts of the route, at some readily remembered time of the hour, as, for instance, 10, 15 or 20 minutes past. The longer the interval the greater the need for this, and to work at 68 or 70-minute intervals is to invite ridicule upon the headway system. It is a nice problem to decide at what point the headway system should give place to a time-table service, but once the 60-minute interval is exceeded, there can be no uncertainty. Where, however, a close headway-service is built up of wide headway services on several interrelated routes, as is frequent in London, these broad rules are open to amendment.

THE flow of traffic over the hours of the day, the days of the week, and weeks of the year, is important in determining an omnibus service. In London a typical route might vary from 1 to 3 over the hours of the day, but—and this is a fact of extreme importance in motor omnibus operation—the volume is well sustained over most hours, and in coming to a decision it may be expedient to ignore the reductions to which the few hours of light traffic tend. Over the days of the week a London route shows only one decided change, that between Sundays and weekdays, the Sunday traffic volume, excluding pleasure routes, being less than half the week-day traffic. On week-days variations are less than 10 per cent, above or below the average, Tuesdays and Fridays showing less, and Saturdays more, than other days. Therefore a separate schedule is only necessary for the Sunday. Over the year, if the volume of summer traffic be represented by 11, in winter that volume falls to 9, but for week-days this variation may be met by two sets of schedules, with some temporary adjustment for erratic interseasonal periods.

THE framing of country services is generally much more difficult, because, while the total volume of traffic is immensely less, its variations are immensely greater. Taking a typical country system in a farming district, hour-to-hour fluctuations over the day range from 1 to 7; week-to-week fluctuations over the year from 17 to 25 (in exceptional cases up to 35); and month-to-month fluctuations for the year from 11 to 28. And to some extent these fluctuations are cumulative.

When the flow of traffic is known, a service can be designed to carry it, but often the flow of traffic is only known after the service has been instituted. It is, therefore, perhaps wisest to err on the side of liberality, for frequency of service itself stimulates traffic. There is indeed a conflict between the aim for high earnings per mile from a densely framed service and high total earnings from a generously framed service, and it is for the judgment of the traffic operator, but if the prospective passengers in each direction are few, or if, not being numerous, the passengers are erratically distributed over the day, a time-table basis is expedient.

The time-table service involves a consideration of the habits and causes for movement of the people served; times when they come to and leave work fix two or more journeys; shopping hours in morning, afternoon, or both, settle others. Do the people visit each other? Do they return home for the midday meal? Do they go to the local cinematograph or theater, or would they, if facilities were provided? When do the entertainments open and close? All these fix other journey times. Thus with a little commonsense and careful thought a time-table service may satisfy public requirements.

At some times a single omnibus may be insufficient, and it may be best to run a second vehicle before, after, or in duplicate with the first. It all depends. If people want to reach work at 5 minutes to 9, a second omnibus to arrive at 5 minutes past 9 is obviously inadvisable. Still, a time-table is more likely to be successful if it duplicates existing accommodation, but, subject to this consideration, greater frequency should be the aim; and as schedules are revised and improved, they will tend more and more to a regular interval service.

So much for the service schedule from the traffic side, but there are many obstacles from the operating side. The traffic day usually starts early and closes late, covering more than 16 hours; the 8 working hours are curtailed slightly at each end for bringing out and putting away the omnibus. So long as the whole falls within, say 12 hours, an extended spread-over, permitting the hours to be divided into two parts with a rest period between, is unavoidable if traffic is to be economically handled. This condition is not forced upon labor in the interests of the omnibus company, but rather forced on the omnibus company in the interests of the traffic.

But the spread-over has other advantages. Traffic flow is generally uneven, and at certain times demands a more closely worked service than at others. By means of the spread-over several omnibuses can usually be worked at times of greatest movement and set aside at times of less movement. Under the somewhat stringent limitations governing the spread-over in London, the service can be varied as much as 25 per cent. which is reasonable enough. For example, nothing is gained by tampering with the regularity of a schedule main route east and west across London for, omitting the morning peak load, which, as a rule, moves in one direction, before midday until after 7 p. m. sufficient movement generally in both directions will always justify the maintenance of the service. The fact that the vehicle is there makes traffic. Profitableness of a route is assured as soon as it can be run without loss, for the margin between earnings and expenses is slender, and it will speedily collect the little more that means a profit, and when this point is reached it is wise to add still more to the service, but not too much. Labor conditions which determine meal reliefs and lay-overs at the terminals may necessitate compromise that will somewhat spoil the ideal schedule, but fortunately one factor enables a certain amount of adjustment. This is speed, which is only limited by the legal maximum or the normal road traffic. In busy sections speed may average 75 per cent. of the legal maximum, on open sections about 90 per cent. but the actual speed is best settled by a test run. It can then be adjusted to help the schedule.

CHECK always and change rarely is a good maxim for a schedule office. Finally, checking must be considered. There are two methods, the one by the conductor on the omnibus, the other by the observer in the street. The conductor can return earnings of each trip, entering up stage by stage the traffic carried, and the way bill can be analyzed and summarized to give a complete picture of the day's working. This however, while costly and laborious, often presents more detail than is necessary. An observer by taking a series of points along the route can record time, direction, and load, and thus generally, from the operating aspect, present a sufficient picture of the working. With change of service in view, the point observation method is indeed best, but in considering change of route, where the system of routes is overlapped and complicated, the traffic analysis method is essential.

Once a vehicle is in use it becomes a factor in the problem, which can only be changed by effluxion of time, unless its value is to be thrown away. The importance of choosing right size and type is therefore obvious. To suit requirements of different routes, various types may be wanted, but with a small fleet, if this means more spare vehicles or spare units, the advantage gained by the traffic will be lost on the engineering side. Choice is here a matter of wise compromise.

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The foremost element in choice of the vehicle is seating capacity but, over and above that, standing capacity has to be considered, though only doubtfully recognized by the authorities. Standing capacity is a real convenience in rapid and great fluctuations of traffic, but it lends itself to fraud, makes the conductor's work almost impossible on occasion, overloads the vehicle, and may add heavily to maintenance cost, especially on bad roads. Still, it must be considered; the passengers themselves insist upon it. On a market day when an omnibus, authorized to carry 44, leaves with 115 passengers, the only wonder is how they all manage to get on.

In size the inclination is always to the largest practicable, but in practice it is only necessary to supply a vehicle large enough for the load which may ordinarily be expected, assuming, of course, that that represents a paying load. In London the "B" type omnibus seated 34 passengers, but with post-war costs it became too small safely to enable working at a profit on moderate fares. So then came the 46 seated "K" type, which earned 16 per cent. more than the "B" though its capacity was greater by 35 per cent. Finally, the "S" type with 54 seats offered 17 per cent. greater capacity than the "K" type, but earned only 6 per cent more; or compared with the "B" type earned 23 per cent. more with a 65 per cent. capacity increase. This illustrates how undesirable it is to exceed certain moderate sizes. Large omnibuses are fully justified in London, thanks to the sustained volume of traffic, but in the country for an odd trip or two large vehicles like this would be impossible, for they cost more to work, and if used to full capacity are slower, because the more numerous passengers consume more time in stopping. The street-car is similarly handicapped, but the omnibus must never be as slow as the street-car. With large vehicles, too, there is a temptation to widen out the intervals of the service, and so to lose frequency. The essence of good operation is service frequency, and more and smaller units will thus often give better satisfaction than fewer and larger ones. Size, too, must be influenced by the conductor's capacity. Also the duty on a 'bus varies with its seating capacity, and wasted capacity means loss also in this direction.

THE capacity, too, determines three other elements—weight, dimensions, and speed. Recently a Ministry of Transport Committee has been going into these matters, and more generous weights are to be permitted. The dimensions allowed correspond with those for all other heavy motor vehicles, except in the metropolitan police area, where the general overall width of 7 feet 6 inches is at present reduced to 7 feet 2 inches and the 27 feet 6 inch length to 25 feet. There can, however, hardly be good grounds for a different standard in London, having regard to the way in which motor vehicles circulate through the country at large. Reference has already been made to the proposed speed increases. These regulations will have a distinct bearing on the choice of vehicle, and will confer important advantages on some classes over others.

Equally important is average working speed, and in this a higher level may be assured by attention to certain aspects of design. A roomy platform by enabling passengers to board and alight at the same time will quicken operation, and a low body with a single step will have the same effect. This low body is not possible with present designs, yet is much to be desired.

Bridges may restrict weight. A 5-ton limit means curtailment to about 20 passengers; a 6-ton limit to 34. Other bridges again may limit height, involving single decks, which reduce the capacity to 32 or 34, unless the 6-wheeler should become feasible, in which case capacity could be raised to about 50.

Again, excessive road camber, steep gradients, sharp corners, or narrow road width may entail a low center of gravity.

The last important element in choice of vehicle lies in its general type. In London the decision in favor of the double-decker has been confirmed over and over again, but in the country one school favor the single, the other the double-decked variety. In London the open top is an attraction. Meterological records show that in a normal year on only about a dozen days does the weather render the tops of omnibuses impossible. A trivial percentage of 5 or 6 is the measure of rainy days of the year. Covered tops have been tried without much satisfaction, and a detachable top would rarely be on when wated, and certainly be on when not wanted. All that appears desirable is a windshield at the front, repeated, perhaps, half-way along the top. The Londoner is fond of fresh air, but the countryman gets enough of weather and sunshine, and so prefers a large singledecked omnibus.

Garages are part of an omnibus system and demand consideration. Here size is the determining factor. A garage must not be too small, or it will be inefficient and relatively costly; nor must it be too large, or it will be unwieldy. The London garages vary in accommodation from 33 to 200 omnibuses, and the economical limit is reached at 100 to 120. Until recently these garages were capable of all that was needful for operation and maintenance of their 'buses, but now the maintenance has been centralized at specially planned works (see "Insuring Continuous 'Bus Service" in POWER WAGON for March—ED.) So that the city garage is on the same level as one in the country. It is merely a place where omnibuses are stored, cleaned, and kept ready for use.

A system of country routes will need a central garage with repair facilities and a series of small sheds at which vehicles are left over night to begin the inward service from the outer points next morning.

The fares to be charged constitutes a wide subject in itself, so comments here made must be confined solely to the operating side of the problem.

First, a scheme of fares must be such as to allow an ordinary conductor to work with proptitude and precision. He must be able to collect fares quickly enough to secure accuracy. If stages are so short that the omnibus passes from one to the next before the conductor has got round, correct collecting becomes impossible. Worse still, some passengers will get a short ride without payment. Such a state of affairs will cause slackness in other directions.

A scheme of fares must appear to the passengers equitable, or they will feel aggrieved, and this discourages travel. To meet this a method of fixing fares known as the "fair fares" scheme was tried. It was based on quite short stages of ½ cent each with a minimum charge of 2 cents. while the difficulty of coinage was avoided by the issue of tokens. But the scheme was not easy to work, and was ultimately abandoned.

The task lies in deciding on a scheme. falling between this extreme and the flat fare, which pleases the public by its gradation and suits the conductor by its simplicity.

NEXT a scheme of fares ought to have a readily known and generally accepted basis. This basis is the series of traffic points which mark the several stages. In determining fares the normal practice is to adopt the mileage scale, and the poor operator will adopt it with scrupulous exactitude, so that traffic points fall at absurd and unimportant locations. Still, the settlement of traffic points is not easy; out in the open country there may be no traffic point at all. Through Epping Forest from the Robin Hood to the Wake Arms there is nothing but trees to break a 2-mile stage, so a pond and a milestone have to serve. By contrast a closely interlaced system of routes like London presents far too many points. One point bearing on this subject is that the passenger has no sure idea of the length of his journey; he tends to reckon distance in time. Yet, though it is well not to be too exact in applying a mileage basis, that basis in the final resort is the key to a scheme of fares.

It is worth discussing this in relation to the size of the vehicle. On the average of the miles an omnibus works with a given proportion of its seats always occupied for each mile the car earns a receipt equal to the number of seats occupied, multiplied by the fare per mile. Given these conditions, the rate to insure a good margin of profit can be calculated.

From this it might be deduced that the higher the proportion of seats occupied the lower the fares. Complications, however, enter; passengers do not always take the full ride for which they pay; hence actual mileage paid by the passenger always tends to be somewhat higher than the theoretical mileage on which the fares are based. Again, with irregular flow of traffic the average load may fluctuate, and fare may vary with the seasons to some extent.

Cheap excursion or return fares in summer may encourage full loads. Again, the proper location of traffic points may, as indicated, make inroads into the evenness of the scale, and then the incidence of the traffic volumes over the stages enters as a factor into the calculation of the final average rate per mile. The larger the scope of operation, the closer the average aimed at will be realized. This is a strong point for the London companies, since not only does their size enable them to distribute as an insignificant burden the cost of a pow-

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erful administration, but it enables them to take risks in cutting their fares to a fine point. The margin between profit and loss is so narrow that it may oscillate between one and the other in a month, but small adjustments soon set the balance right.

If earnings per mile are taken as a standard representing 100, expenses are between 85 and 90, reserve for obsolescence and renewal 5, and the balance available to meet capital charges 5 to 10. If the expenses are taken at a favorable level of, say, 85, they are distributed roughly as follows:

Wages, driver, and conductor	31
Maintenance	20
Gasolene and tires	15
Cleaning, lubrication and inspectoin	4
Uniform, tickets and supplies	2
License, vehicle duty	3
Other operating expenses	5
General expenses	5

Thus 72 points of the expenditure, or with license duty 75, are directly related to the mileage worked by the 'buses, only 10 points to overhead costs. Manifestly, then, it is expensive to keep an omnibus not in actual service: half the cost actually incurred in working is equally incurred standing still; wages are 43 per cent, of the cost, and unless they cease, the costs amount up all the time—hence the importance of the spread-over and of a one-man 'bus for light traffic. Hence the economic advantage experienced by the "jitney" proprietor running his own omnibus unassisted; hence the need to reduce the lay-over to a minimum.

A liberal daily mileage is important, for of the immediate working costs about 29 to 39 per cent. of the total spreads with the increase in mileage, and this applies even more strongly to the overhead costs, representing another 12 per cent. The usual London mileage ranges from 115 to 130 per vehicle per day, and in the country variations must be even greater. Of direct working costs 36 points, or just less than half, are affected not by mileage solely but by speed as well; these combine a time and distance element; hence the importance of reasonably high average speed. There may thus be so little difference in cost of standing an omnibus off in the slack part of the day and running it that it may be fairly easy to earn the small extra cost in question; there is so even a balance between the two classes of expenditure—the proportion is approximately 41 to 44—that there must be a temptation to run.

There is little margin for mistakes. A miscalculation of 10 per cent. wipes out almost all net receipts, and how easy it is for traffic to disappear to this extent! Hence the need for a close check, for a stout courage, and for a patience that refrains from hasty adjustment. It is the last passenger that yields the profit, so good advertising, good reputation, and good conducting are important assets.

Of the immediate working costs 60 to 80 per cent. are practically unaffected by size of the vehicle. The limiting point is that at which the vehicle ceases to be workable by one man, but just how many passengers a single man can look after, however, depends on many phases of operation.

The Lake Shore Transportation Company of Milwaukee is seeking a franchise for the operation of motor 'buses between that city and Chicago.

Road Capacity and Vehicle Design and Use

By B. B. BACHMAN
Chief Engineer, Autocar Company

IT appears to me to be particularly unfortunate that there should be any controversy between the railroads and the users and manufacturers of motor vehicles, instead of complete harmony and coöperation. Except in the most isolated cases, competition between these two forms of transportation is most unlikely. I think this is almost universally true with regard to transportation of goods; and in the transportation of passengers it is almost equally true if we stretch our imagination to embrace what must be the development of the future. I recognize the fact that there is a large amount of capital invested in street-railway transportation, but I am also impressed more and more daily with the fact that the streets of our cities are becoming less able to accommodate the burden of traffic which they are called upon to bear. It seems to me not at all improbable that this condition will make it imperative in the not very distant future to replace track vehicles with a more flexible form of vehicle for short hauls and where frequent stops are necessary.

This problem of highway capacity as evidenced by our city streets deserves the most careful study on the part of every automotive engineer, particularly as to what its probable effect will be on future design requirements as affecting the size of the vehicle, the control with respect to steering, turning-radius, acceleration, and braking. In many of our cities very stringent regulations with regard to parking have been put into force. It is useless to spend our time in railing against these provisions for, in some measure at least, they represent the legitimate effort to distribute the use of the streets in a fair way among all citizens. The problem presented is of the most complex nature and deserves careful study and analysis.

Another result of the increasing traffic density is the lowering of the efficiency of motor vehicles as a means of saving time. As the cost of operation of motor vehicles has been reduced, and the possibility of use thereby increased, this new factor of limitation of speed, due to congestion, becomes increasingly important.

In the broader aspect of transportation in rural and suburban communities there should be practically no question of conflict between the railway and the motor vehicle. We have in this country a sufficiently close-up picture of the development of transportation facilities to be able to get a very comprehensive and intelligent view of the relation between various means of transportation and the establishment and development of communities. The early settlements were along the seaboard and the more navigable streams, and this condition of affairs continued up to the time of the development of the railway, which resulted in the unlocking of the vast inland empire and the linking up of the Pacific Coast with the Atlantic which would have been practically impossible without this new means of transportation. The development of electricity and its application to high-speed interurban lines was the next step in bringing high-speed transportation into closer contact with the small community and individual.

It is obvious, however, that the operation of rail lines calls for a virtual monopoly of territory in the form of a franchise and limits the operation of vehicles over any given track to one centralized authority and calls for fixed schedules of operation.

The advent of the motor vehicle has resulted in placing in the hands of the individual a smaller and more flexible unit with practically the equivalent speed capacity of the railway. This vehicle, capable of being operated over the road, can be made more truly competitive and infinitely more flexible and independent of fixed schedules. The growing use of the motor car and the truck, coincident with the development of and as an auxiliary to the railway system, has resulted in extensive suburban and rural development which would probably have been as impossible without the motor as the development of the inland cities of this country would have been without the railroad.

While this development has resulted, and the increase in reality value is recognized and acknowledged, the increasing traffic, particularly over main routes, will bring a reaction, unless we are peculiarly alert to study and suppress in design all objectionable characteristics of our vehicles to the greatest possible degree. I appreciate that the control of all these features is not in the hands of the engineer or manufacturer, but he should be thoroughly informed as to what they are and be prepared to coöperate intelligently with regulatory bodies to make sure that rational measures for the protection of the public are enforced which do not impose unreasonable restriction on road transportation.

Much of the discussion on the question as to who should bear the burden of the cost of construction and maintenance of our highway systems or whether the motor-vehicle operator is receiving a public subsidy which is not shared by the railroad, etc., appears to be beside the point. The cost of transportation of passengers and freight, by railroad, water or highway, is borne by the whole community and shared by every citizen in proportion to his requirements for transportation. I believe this to be so, whether the cost of transportation is included in the cost of the commodity or whether it appears partially in the form of taxes. The big fundamental problem is to determine the economic field for each medium of transportation and the relation each should bear to the other for maximum efficiency, and the most satisfactory means of proportioning the expense to the individual.

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Graham Bill May Pass

Early passage of the Graham "anti-dumping" bill by Congress has been urged by the Department of Commerce. The measure, which would prevent the return to the United States of motor vehicles and other war supplies by imposing a 90 per cent. *ad valorem* duty on them, is needed, the department believes, to stabilize the American market.

Passage of the bill is being urged by the department as a matter of fairness to American producers. Secretary Hoover, in a letter to certain members of the Senate Finance Committee, which is now holding up further consideration of the bill, has pointed out the fact that the government has sustained enormous losses on the sale of war supplies in Europe. These losses have resulted in profits by the speculators abroad, thus enabling them to take advantage of the government's prices and reimport millions of dollars' worth of motor vehicles into the United States, cutting prices of legitimate manufacturers. This, the department has notified members of the committee, unofficially, is unfair to the American manufacturer.

There appears to be no organized opposition to the passage of the measure, although it has been before Congress for ten months. It was first reported to the House August 10, 1921, from the House Military Affairs Committee, passed the House on August 12 and was referred to the Senate Finance Committee. Senator McCumber, chairman of that committee, has devoted practically his entire time to the tariff bill, and the committee has held no hearings on the measure. In a letter to the department, Chairman McCumber expressed doubt as to the necessity of the bill to protect the motor vehicle market.

Rail Motor for Oklahoma

Rather than do away with their service entirely, as many have done, because their line was operating at a loss, officials of the Oil Fields Short Line Railroad of Oklahoma decided recently to motorize their equipment. Instead of using a steam locomotive to haul a mixed train, they now operate an FWD rail car over their 8-mile run and have cut their operating and maintenance expenses materially.

The Oil Fields Short Line Railroad operates between Dilworth, a small town in the Oklahoma oil fields, and Clifford, Oklahoma, where it connects with the St. Louis and San Francisco Railroad.

The FWD rail car is equipped with a passenger body capable of accommodating approximately 24 passengers. The car is equipped with M.C.B. couplers front and rear, so that when it becomes necessary to haul freight a box-car or flat-car can be coupled on and hauled on one of the regular passenger runs. Regular schedules are maintained and, though this short line is now operating at a profit instead of a loss, patrons of the line are afforded just as efficient service as was formerly given.

Thirty states are offering employment to some 200,000 men, during the next six months, on road construction.

Two Motor Sprinklers Save City $700 Weekly

By R. T. BANKS

ONE of the most striking examples of the saving in public funds made possible by motor trucks is the case of the City of Lawrence, Massachusetts. The two motor sprinklers in the engineering department are the brightest kind of examples of what a municipal department can accomplish in the way of practical and efficient economy by absolutely divorcing politics from it.

Until the latter part of last year it had been the custom of years to hire a driver and team of horses for each of the street-watering carts operated by the engineering department. As the last price paid was $10.00 a day for a driver and his two horses, the annual award of this work became a choice bit of political patronage. Horse-drawn watering carts provided such a slow means of dispensing this important service that it required 14 carts to cover the city. At $10.00 a day, this brought the cost per diem up to $140.00, and a 7-day week caused this cost of service to mount up to a figure of $980.00 each week. The street-watering season, according to Alderman Finnegan, is estimated at seven months, or approximately 30 weeks, which brought the annual cost of street-watering up to $30,000 in round numbers.

Last summer Alderman Finnegan decided to investigate and ascertain if that high figure could not be materially decreased. He went exhaustively into the subject of motor sprinklers to such an extent that he decided to make the change from horse-drawn to motor sprinklers.

The latter were only in operation for the last few weeks of the 1920 season, but long enough to establish their value. This year they have proved the wisdom of Alderman Finnegan's change. The first cost of the sprinklers was a big item, slightly better than $19,000 for both, but they will virtually pay for themselves this year. The two machines should be usable for many years, and each year of their operation after this should represent a saving towards the $20,000 mark.

The 14 horse-drawn carts which wended their separate ways over the city streets through the hot, dusty summer days cost $980.00 per week. Each motor sprinkler requires a crew of two men, a driver and assistant, and they are worked in two shifts of 8 hours each day.

The eight men work seven days each week, for $5.00 a day wage, bringing the wages of all the employes of the street-watering department up to $280 a week—a big drop from the figures under the old system.

At the present time the sprinklers water the streets on the day shift, and flush the paved thoroughfares in the evening hours. Alderman Finnegan states that the city is as completely covered as under the old system and the sprinkler gives better results. Close inspection of the work seems to bear out this statement.

The alderman states that, if his program of 90 new streets is accomplished this year, there will be so many streets which will not need watering next year that it will be possible to dispense with one sprinkler. Eventually, he states, the street program calls for paved and tarvia streets to such an extent that watering will be unnecessary, and that it will then only be necessary to use one sprinkler for street flushing. In that event, the city would lose considerable in street-watering assessments, but with the elimination of expense in the department one would undoubtedly offset the other.

New Stewart Model

The Stewart Motor Corporation has announced a new "Utility Wagon." This new model is capable of climbing grades with capacity loads, and is capable of developing a speed of 35 to 40 miles per hour.

This Utility wagon has large 34x4½ cord non-skid tires all around, a 3-bearing Buda 3⅝x5⅛-in. motor designed particularly for speed truck work. It is of the removable head type. The cylinder block is also removable. This engine is rated at 21.03 S.A.E. horse-power. The motor has a full pressure-feed oiling system to crankshaft and connecting-rod bearings, with an oil-pressure gage on the instrument board and a large 18-inch steel-plate fan driven by 1½ inch flat leather belt.

This truck has a clutch of the dry-plate type, with one steel plate, and another set of disks of clutch facing material. The engine, clutch and transmission are mounted as one unit, on three-point suspension. The transmission main shaft is mounted on annular ball-bearings.

The rear axle is the Clark internal-gear drive, the same as used on other Stewart models. It is geared 5½ to 1. The front axle is drop-forged from carbon steel, heat-treated.

The steering-gear is of the screw-and-nut type with an adjustment on the thrust bearings for removing any end motion of the screw that may develop.

The front and rear springs are semi-elliptic in type, 38⅝ and 50 inches long, respectively, and 2¼ inches wide. The rear spring has 15 leaves and is equipped with full length rebound plate bronzed bushings, and hardened steel pins are used throughout. Spring lubrication is by Alemite system.

The wheels are of the artillery type, 12 spokes front, 14 rear.

Regular equipment consists of electric lights with legal lenses equipped with focusing devices, electric tail lamp, tool box, 111-hour storage-battery, tool jack, electric horn, oil-gage, front bumper, ammeter and dash light.

Price of this chassis complete with the above equipment is $1,245.00 plus war tax f.o.b. Buffalo.

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1½-Ton Intercity 'Bus Earns $2,077.15 in Year

By L. W. CHASE
Carman, New York

ONE hundred and thirty thousand miles with only $100 spent for repair parts is the record of one of our 1½-ton Selden 'buses. With such a record as this, it is no wonder that we purchased 3 additional machines in succession.

This first 'bus is 2½ years old. It has earned a net profit of $5,192.88 in 2½ years' operation, or at the rate of $2,077.15 a year. Our 2½-tonner has earned a net profit of $1,768.75 in 15 months, or an average of $1,415 a year.

Our 'buses were purchased as follows: May, 1919—1½-ton; September, 1919—1½-ton; August, 1920—2½-ton; July, 1921—1½-ton. So we now have a fleet of 4 'buses which are performing very satisfactorily and earning good profits.

Two of the 1½-tonners make regular trips between Carman, a town of 1,000 population, and Schenectady, a trip of about 3½ miles. Sometimes the 'buses go on to the General Electric Works, half a mile further. They make about 3 trips a day to the G. E. works, one in the morning, one at noon, and one at night, in order to take the people to and from work, and also to take them home at lunch. When hauling these workmen we have had as many as 60 passengers on a truck. We are getting an 8-cent fare for this trip.

The 2½-tonner is used for heavy work morning and night, and also for special work, such as picnics, dances, etc. The third 1½-tonner is used exclusively for special trips, and works particularly hard on Saturdays and Sundays handling picnics. This truck recently made a 120-mile trip to a point near Indian Lake, carrying a party of 14 men and a week's supplies for a hunting trip. I drove the truck myself, and stayed with the party, getting a good vacation in addition to making $50 profit on the job. This is merely one of many ways in which our 'buses make money.

We do all our own repair work, averaging about 3 hours a week on each truck. We replace the oil every 500 to 800 miles. As a result of our excellent maintenance system our repair costs have been unusually low. The good roads around here also keep down repairs.

The 1½-tonner which has traveled 130,000 miles still has its original bearings, and we have never seen its transmission. We haven't spent over $100 for repair parts, and that includes some spare parts still on hand. We figure 3 hours repair labor a week at 18 cents an hour, in addition to the cost of the parts. The truck is still in perfect condition, and averages 10 miles to the gallon of gasolene. It costs $19.07 a day, and brings in about $25, so it is a profitable investment.

The 2½-tonner has traveled 25,000 miles and also has an enviable repair record. We have spent only $10 on this truck for repair parts, and put in only the small amount of labor required to keep it in condition. This truck costs $15.95 a day, and averages $20 a day income. Both trucks operate about 350 days a year. We depreciate the lighter trucks on a minimum life of 200,000 miles. The heavier truck may run as long, but at present we are only figuring 100,000 miles for it.

The following gives a detailed statement of operation and costs on a 1½-ton and a 2½-ton 'bus:

1½-TON MOTOR 'BUS.
OPERATING RECORDS.

Total Period.

Period covered, years	2½
Days operated	875
Total round trips	17,330
Passengers carried	320,800
Miles traveled	130,000
Gasolene used, gallons	13,000
Cylinder oil used, gallons	361

Daily Averages.

Round trips	19
Passengers carried	366
Miles traveled	148.6
Miles per round trip	7.8
Passengers carried both ways	19
Passenger-miles	1,411
Miles per gallon of gasolene	10
Miles per gallon of cylinder oil	360

COST RECORDS.
Investments.

Chassis, complete	$ 3,000.00
Tire value (pneumatics)	126.60
Total, less tires, to be depreciated.	$ 2,873.40

Fixed Charges—Yearly.

Interest on total investment (4 years) at 7%	$ 131.25
Taxes and licenses	65.00
Insurance	45.00
Garage expenses	150.00
Total per annum	$ 391.25
Total per month (per day $1.12)	32.60
Total for period (2½ years)	978.12

Variable Charges—Period.

Fuel at 26 cents a gallon	$ 3,380.00
Cylinder oil at 50 cents a gallon	180.50
Tires, 130,000 miles ($126.60÷18,000-mile life)	910.00
Depreciation, 130,000 miles ($2,873.40÷200,000-mile life)	1,872.00
Maintenance and repairs, estimated	1.562.00
Total variable charges (per day $9.03)	$ 7,904.50
Driver's wages—2 (per day $8.91)	7,800.00
Total fixed charges	978.12
Total operating costs	$16.682.62

Unit Costs.

Cost per day operated	$ 19.07
Cost per mile traveled	.128
Cost per passenger carried	.052
Cost per passenger-mile	.014
Repair cost per mile, estimated	.012
Repair cost per mile, actual	.003

2½-TON MOTOR 'BUS.
OPERATING RECORDS.

Total Period.

Period covered, months	15
Days operated	437
Total round trips	3,300
Total loads, passengers	145.600
Miles traveled	25.000
Gasolene, gallons used	3,571
Cylinder oil, gallons used	100

Daily Averages.

Round trips	7
Total loads, passengers	333
Miles traveled	57.2
Miles per round trip	8.17
Loads per trip, passengers	47
Passenger-miles	1.344
Miles per gallon gasolene	7
Miles per gallon oil	250

COST RECORDS.
Investments.

Chassis, etc., complete	$6,500.00
Tire value (pneumatics)	584.70
Total, less tires, to be depreciated.	$5.915.30

Fixed Charges—Yearly.

Interest on total investment (5 years) @ 7%	$ 273.00
Taxes and licenses	85.00
Insurance	45.00
Garage expenses	150.00
Total per annum	$ 553.00
Total per month (per day $1.58)	46.08
Total for period, 15 months	691.25

Variable Charges—Period.

Fuel at 26 cents a gallon	$ 928.46
Cylinder oil at 50 cents a gallon	50.00
Tires, 25,000 miles ($584.70÷12,000-mile life)	1,217.50
Depreciation, 25,000 miles ($5,915.30 ÷100,000-mile life)	1,480.00
Maintenance and repairs (estimated)	656.00
Total variable charges (per day $9.91)	$4,331.96
Driver's wages—1 (per day $4.46)	1,950.00
Total fixed charges	691.25
Total operating costs	$6,973,21

Daily Costs.

Cost per day operated	$ 15.95
Cost per mile traveled	.278
Cost per passenger	.048
Cost per passenger-mile	.012
Repair cost per mile, estimated	.026
Repair cost per mile, actual	.006

Laundries Turn to Trucks

With the laundry business taking on the proportions of a big-scale enterprise and using the most up-to-date delivery and equipment, signs are not lacking that the old era of laundering is passing. Not so long ago the words "laundry business" conjured up immediately a vision of a quaint old store with its dilapidated sign in front announcing one "Wing Lee" as the proprietor, or else the phrase brought up a picture of the "wash lady" of a few years ago who called for the family linen and brought it back, next day, snow white and immaculate.

The modern laundry is more likely to be housed in an impressive building, with a modern garage for its trucks, and laundrymen are not reluctant to admit that the motor truck is playing an important part in their growth. As an example of progressive delivery methods, 74 laundries throughout the country operate fleets of three or more Dodge machines, while the count of owners of one or two such cars in laundry service runs into the thousands.

One prominent laundryman, Adrian Otte, of the American Laundry Company, Grand Rapids, Michigan, has recently added seven Dodge vehicles to his delivery service. Interestingly enough, Otte still remembers when his whole reliance was a colored boy who made deliveries on foot, and just when the spirit happened to move him. And the head of the firm, on rush days, was not above filling his own arms with bundles and carrying the "biled" shirts and linen to the homes of distinction. Otte plans gradually to change over his entire delivery equipment to machines, as is the case with many other laundries who have an oportunity to learn how well the motor truck is adapted to their requirements.

Louis K. Gordon, former associate engineer of Mack trucks, and designer of the original Bethlehem trucks, has returned to his old post as chief engineer of the Bethlehem Motors Corporation of New York.

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Laws Should Encourage Road Use

By E. J. MEHREN

AS RECENTLY as two years ago discussion of regulation as applied to highway traffic would have been confined largely to such topics as the restriction of weight, speed and size of vehicles. Those topics are still important, but there has entered a new phase—the regulation of vehicles operating for hire as common carriers—and that subject needs serious attention.

I purpose, therefore, to divide the subject—highway transport regulation—into two major divisions, (1) of motor vehicles generally, and (2) of common carriers. I fully realize that the first division has had lengthy consideration. However, this seems an appropriate occasion for summing up, finding where we stand on vehicle regulation and whither we should go.

The discussion between vehicle regulation and highway-transport regulation is significant. It marks the change from the conception that the motor vehicle as an interloper on the highway or an instrument of pleasure, to the settled conviction that highway transport is an essential part of our social and economic life. It is not so long ago that highway officials and large sections of the public resented the new mode of locomotion. That time seems now far removed. Possibly the great war record of the highways marked the change in thought. Today we all accept the highway as a great economic instrument. Far from desiring to discourage its use, we encourage it, so that the benefits of economic transport may be extended as much as possible; so that the people, through savings in the cost of carriage, in transport time or in comfort and convenience may get dividends on their highway investment.

These considerations may seem academic, but from them flow the basic principles which should control motor-vehicle regulation. If the highway be an economic agent of the public, regulation should be such as to encourage its greatest use. Rules or laws which restrict its use unreasonably or make that use uneconomic run contrary to public interest. These economic truisms lead to the following principles:

(1) Regulation should not be punitive; (2) It should prevent abuses by individuals who would invade the rights of others, and make the use of the highway dangerous, uncomfortable or expensive; (3) It should be kept to a minimum consistent with maximum economic use of the highway.

It will be found that all sane regulation now on our statute books conforms to these principles. Excessive speed, for example, if general, would drive away those whose regard for safety is normal. Excessive loads would break up the roads and thus prevent or curtail their use. Unusually great widths interfere with passing and the number of vehicles that can be put over the road in a given time.

It will be agreed that we have progressed far in vehicle regulation—in some cases in a wrong direction—but the end is not yet. In the interest of the maximum economic use of the road there are needed in many states amendments to present law, first, for the sake of the states individually, and, second, in the interest of traffic that passes over state boundaries.

As to all such matters needing revision we have in the Uniform Vehicle Law an excellent guide. Only one feature of it failed to get the unanimous approval of the competent authorities who drafted it, namely, the question of maximum weight. This happens, too, to be the most important feature affecting interstate business. Nevertheless, it is the point where we must expect divergence of view, on account of difference in road experience and conditions. Considering the results of road-traffic counts, it does not seem to be wise to insist too strongly on the 28,000-pound limit, unless it be hedged with a provision allowing restrictions on certain routes.

Of a different character, though, is the enforcement of vehicle laws. If a vehicle law is to accomplish its purpose of promoting the maximum use of the highway consistent with safety, economy and convenience its mandates must be obeyed. We must be a unit for vigorous enforcement and might well go on record not merely for equitable motor-vehicle laws, but for their rigid enforcement when once adopted.

Of special importance is the enforcement of weight restrictions of trucks. There was inclination, at first, to regard as too drastic the Maryland method of dumping overloads on the highways wherever violating trucks were apprehended. Its justice, however, was never challenged. Now there is a conviction that that is the only way in which weight restriction laws can be enforced. It may well have general adoption.

Tied up with weight restriction and its enforcement is the need for giving highway authorities power to limit loads to less than the legal limit, or to rule them off certain roads entirely during the spring softening period. This is a generally accepted regulation that works to the benefit of the road-using public and of the public generally. The right to do this should be included in every motor-vehicle law.

There are other adjustments desirable in present laws. The horse-power and gross-load basis for assessing fees proposed by the uniform law should be generally adopted instead of the sixteen other ways found in present statutes. Where reduction in fees for pneumatic-tired vehicles is not allowed, such provision should be made.

These comments suggest that there is need right now for a new consideration by both interested and impartial parties of the present laws, to the end that there may be prepared for the meetings of the legislatures next winter sound conclusions as to present statutes and the desirable lines of revision.

The same principles obviously apply to the regulation of common-carrier motor vehicles as in the case of general regulation.

It is possible to make a strong theoretical case against regulations of motor-vehicle common carriers. There are sharp differences between the business of motor-vehicle transportation and that of steam and electric railways. Since the motor vehicle operates over a publicly provided track, and the necessary private investment is small it is easy to introduce competition. Steam and electric railways, on the other hand, require a large capital investment; the introduction of competition is difficult. Again there is less to be gained, at least on the surface, by giving monopolistic privileges to motor-transport operators than to electric light, gas and telephone companies. Duplicate telephone systems are an inconvenience and an added expense to the public. So, too, are duplicate electric power and illuminating gas systems. In motor transport duplicate investment is likely and a burden to the public, but the plant is mobile and, if in operation the resulting ineconomies begin to pinch, it is easy to move the equipment elsewhere. The duplicate plant investment is not an irremovable burden on the public.

BUT however strong the theoretical arguments against regulation there are practical considerations that outweigh them. First, the public has long since determined that regulation of common carriers is necessary, and it is not likely, no matter how strong the theoretical arguments, to make an exception in favor of highway transport. Second, sufficient evidence has already been offered to show that where motor transport is heavy, the public is better served by regulated than by unregulated service. Third, regulation offers the possibility of stabilizing the highway-transport business; saving it from the destructiveness of uninformed fly-by-night competition.

Already there is strong sentiment both for and against common-carrier regulation. Where fly-by-night operators, who do not know their costs, have brought substantial operators into or near bankruptcy there has been a cry by operators for regulation and for the granting of monoplistic franchises. Where the public's interests have been made secondary to profit, by those who sought to skim the cream, the public in turn has demanded supervision of service and of rates.

On the other hand, there have been those who have fared well in the motor-transport business so far, particularly over routes that would not justify common-carrier franchises. They object to the prospect of regulation. They are, in part, of the class who are willing to jump from place to place, picking up business while the go-

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ing is good—in summer peaks for example—and leaving a local trustworthy operator to take the lean business.

Despite prejudice against it, however, it is likely that common-carrier highway transport regulation is here to stay. It has the advantages already cited, but it holds, also, the danger of checking development. It is possible that public regulatory commissions without adequate thought as to its applicability may load on motor transport in its infancy much of the regulatory practice that has developed during twenty-five years of railway and other public-utility regulation. That this fear is not groundless is illustrated by the action of the Nebraska State Railway Commission. It took jurisdiction over highway transport and promulgated rules. After two years of trial on its own initiative it relinquished the control it had taken. It concluded that motor transport in Nebraska had not advanced to the point where common-carrier regulation was necessary, that the cost data available were not sufficient for an intelligent determination of rates and that the commission lacked revenues for effective enforcement of its regulations. In other words, the commission concluded that it was dealing with an infant industry and that the nature of the child has not developed sufficiently to allow of intelligent direction. There is here a suggestion to other regulatory bodies that they accept the fact that this is an infant industry; that it is an industry different from other common carriers; that it deserves study before regulation, to the end that the regulation may, broadly, be in the interest of the public.

Two critical elements in motor-transport regulations are the rates to be charged common carriers and the fees to be paid by them. Some contend that highway transport rates should be set higher than cost plus a fair return in order to offset the advantage which the motor vehicle has because the public furnishes the "track." This is proposed on the theory that it is the duty of regulatory bodies thus to offer some degree of protection to the steam and electric railways, which furnish their own track.

The argument is unsound. We are not unmindful of the cost to the railways of building and maintaining their own track, nor of the advantage to the motor vehicle of having its track furnished by the public. But we recall, also, that everyone has free use of the highway. A common-carrier motor truck transporting my goods for pay does nothing, in essence, but what I as an individual have a free right to do. I choose merely to employ an agent. To penalize him is to penalize me over and above a fair cost for service because I choose to take advantage of the economies or conveniences of an alternative type of transportation.

If we consider transport on inland waterways we find an analogous case. River and canal navigation require the dredging and maintenance of channels, which are done at government expense. We have at times charged a toll to help pay for the improvement but we have not assessed a penalty to bring the rates on water-borne carriage up to those of the railways. On the contrary, we have gloried in the fact that water rates were lower than rail rates; in fact we have actually used water rates as a club to secure lower railway rates, and we urge that each type of transportation—rail and water—find the commodities it is best suited to transport, believing that thereby the nation will be most economically served.

Indeed, if the penalty theory is to be adopted what shall we do in the day when air transport becomes a formidable rival of land and water carriage. Shall we hobble it by penalty rates in the interest of the earlier forms of transportation?

Obviously, sound economics demands that we allow each type of transport to develop its utmost economies and to find its place in the transport system in accordance with the advantages it offers the public. If an earlier form suffers thereby, that can not be helped. Every day in industry a new machine tool sends old ones to the scrap heap; new power units replace the old before the old are worn out. Waterway transport gave way in part to the steam railway; in turn the steam railway suffered a loss of business when the electric railway was developed. Now it is the turn of the steam and the electric railways to lose some business to the highways. But they will lose only what the motor vehicle can more cenomically or conveniently transport. They will retain what will be to the advantage of the public for them to retain. Also it is clearly foreshadowed that highway transport will prove to be a valuable adjunct and benefit to the railways. Already the motor truck is relieving them of the unprofitable short-haul business.

Naturally, the motor vehicle engaged in common carrier service must pay for the use of the road just as a privately owned and operated vehicle does. A tax graded by extent of use of the road is the preferable one, and where that does not exist a somewhat higher tax on the common carrier is warranted because of the certainty of greater use of the road. Furthermore, since it has become a fixed principle of our system of taxation that individuals and corporations shall pay for the privilege of doing business on public streets, the common-carrier operator must expect to pay a franchise tax. At present this tax is in most states assessed in the form of a fixed fee, which is generally determined for passenger vehicles by the seating capacity. In levying these additional taxes the principle already laid down of not being punitive should apply. The benefits of motor transport should be returned to the public directly in the rates rather than through taxes.

It is apparent then that the field of motor-transport regulation, whether of private or common carrier vehicles, has many problems to which the minds of American business men need to be addressed. It is not enough that those with a business or professional connection with highway transport—the vehicle manufacturers and owners, highway engineers and highway officials—take interest in the subject. It touches too closely the welfare of American business and the American people to allow them to be indifferent towards it. The views and conclusions of the specialists need the endorsement and support of the public and particularly of the business community, which has the background to judge soundly of the solution of economic questions. It may be well to advocate, in my judgment, the following broad principles of highway-transport regulation:

1. That regulation be encouraging, not punitive.

2. That it protect the rights of road users and prevent abuses.

3. That there be a minimum of regulation consistent with maximum economic use of the road.

4. That there be rigid enforcement of motor-vehicle laws.

5. That it is desirable, when the traffic warrants, that highway carriers engaged in regular transport service be designated and treated as common carriers, and be subjected to common-carrier regulation, to the end (a) That the public may be better served, and (b) That the business of highway transport may be stabilized.

6. That common-carrier regulation, where adopted, should permit highway transport to develop its own inherent economies and particularly that it be not artificially penalized and handicapped in favor of competitive forms of transportation.

'Buses Favored for Broadway

Recommendations for substitution of up-to-date motor 'buses as a means of surface transportation on Broadway, New York, were renewed when the Transportation Committee presented its report at the quarterly luncheon of the Broadway Association at Hotel Astor. The report was prepared in connection with the campaign which the association is making to open Broadway to normal vehicular traffic and restore the street to full usefulness.

Calling attention to an increase of 57 per cent in the use of motor vehicles in New York City during the past three years, the report states that 154,700 motor vehicles enter and leave the city daily, and declares that this number will be increased 6,610,000 in the first year of operation of Hudson River vehicular tunnel.

Reference was made to shifts in business centers that have occurred, and the suggestion advanced that future city planning be directed to stabilizing existing business districts, and that no plan should be adopted which would result in the misuse of existing facilities in established business districts. The report expressed entire accord with the Transit Commission in its efforts to consolidate the transit facilities of city, and to extend Broadway subway facilities as announced in the commission's plan of construction on which public hearings have been held during past month.

Springfield Will Control 'Buses

The city of Springfield, Massachusetts, has adopted a new ordinance which places control of 'bus lines in the hands of the city council, while the regulation of the services is left to Thomas H. Benton, supervisor of motor 'buses. Under the terms of the new ordinance the license fees collected from the 'buses may be divided among the different municipalities through which the 'bus routes run.

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Goodyear Working on 8-Wheeler

The Goodyear Tire & Rubber Company, which created so much interest in the development of 6-wheeler vehicles two years ago, is working on a new design which employs eight wheels. The original 6-wheeler is being remodeled and will carry a street-car type of body of Peter Witt design, with pay-as-you-enter folding doors and collapsible steps, and seats and standing space for 55 passengers. The chassis and wheel-base of the new vehicle are practically the same as in the old one, the eight wheels being mounted in two trucks of four each.

The distance between the center-line of the trucks is 180 inches. The four front wheels will be used for steering through the operation of a single steering wheel, the front and rear wheels of the steering truck being provided with different turning radii so that the rear ones will track with the front ones.

Legge Harvester President

Following the refusal of Harold F. McCormick to accept re-election as president of the International Harvester Company, Alexander Legge, vice-president and general manager since 1919, has been made president by unanimous action of the board of directors. He will be a member of the company's executive committee, together with Mr. McCormick, Cyrus H. McCormick, chairman of the company, William D. McHugh, general counsel, and John P. Wilson, consulting counsel. Mr. Legge has risen from an obscure position as collector in a remote branch office to the highest position in the company, all in 31 years. Beginning as a collector of farmers' paper, he became in rapid sucession collection manager in the Council Bluffs office, then manager of it, then manager of the company's collection department at Chicago, then assistant manager of domestic sales, then assistant general manager, then general manager, and in 1919 vice-president.

Bethlehem Line Has Three Models

Howard B. Hall, president of the Bethlehem Motors Corporation of New York, which Mr. Hall formed after his purchase of the assets and business of the old Bethlehem Motors Corporation about a month ago, has announced that the new corporation has already under production a new series of motor trucks with list prices as follows:

Model "KN," 1-ton	$1,195.00
Model "GN," 2-ton	1,595.00
Model "HN," 3-ton	2,395.00

Refinements in design include heavier units, greater accessibility retaining the Bethlehem-made motor, which is built complete in the Pottstown plant of the company.

The new corporation will operate through distributers and dealers as did the original Bethlehem Motors Corporation, of which Mr. Hall was vice president, and it is understood that a number of the original Bethlehem distributers and dealers have already secured their old territories.

Surety bonds or liability insurance now must be carried by owners of all busses in Canton, Ohio. An ordinance requiring bonds of from $10,000 to $20,000 was passed recently.

Daily Service on Cincinnati Hills Costs 14.2 Cents a Ton-Mile

By R. PRICE

Nor ood Iron and Metal Company, Norwood, Cincinnati

IT takes a very well built truck to do the work required of it in the iron and steel business; and when purchasing a new truck 8 months ago we kept this fact in view. We are wholesale and retail buyers of rags, iron, metal and all kinds of paper stock.

At the time that we were in the market for a truck, we considered various makes and studied this information with our 3 years' experience with trucks, and finally purchased our present machine.

Up to the time when business conditions became so bad, this truck was making long trips, hauling baled waste paper from the downtown district to the paper mills out at Red Bank, at the east end of the city. We buy this waste paper from the junk shops and haul it to the mills, an average distance of 10 miles. This truck was hauling an average of 4 tons to a load and making 3 trips a day. When we buy paper from the junk dealers we often pick up a small amount of scrap iron also. This is just thrown on the truck; and as it passes the yard on the way to the mills the junk is thrown off. So the truck goes on to the mills with only its load of paper, which averages 4 tons.

Cincinnati is a very hard town on a motor truck, because there are a good many hills and the streets are rather rough. In handling waste paper we have to haul from the west end of the city to the east end, going through all the traffic. There is one hill especially that we always have to climb with a full load. This hill is about a mile long, and has one short turn that makes it extremely hard to climb with a heavy load. Then after getting out of town, the roads on the way to the mills are pretty rough.

In the 8 months we have had this truck it has not cost us a cent for repairs. We are allowing $300 a year for maintenance and repairs. Because of the heavy construction of the truck—a point which we carefully investigated before buying—we are depreciating it on a basis of 110,000 miles. The knowledge of truck performance we have gained through the operation of other makes fully justifies this estimate.

During the 8 months ending April 1, 1821, the truck operated 203 days and traveled a total of 12,180 miles, or an average of 60 miles per day. It cost us $16.99 a day to operate, including $5.83 per day for driver. Making 3 trips a day, handling a total of 2,436 tons of waste paper. This gives us a cost of $1.42 per ton, and 14.2 cents per ton-mile.

We consider these costs very satisfactory, especially as the truck is obliged to run empty one way, and is working under very hard conditions. Nevertheless it has proved itself thoroughly dependable, and able to do efficiently the work expected of it.

Detailed records follow:

OPERATING RECORDS.

Total Period.

Period covered, months	8
Days operated	203
Total round trips	609
Total loads, tons	2,436
Miles traveled	12,180
Gasolene, gallons used	2,436
Cylinder oil, gallons used	80

Daily Averages.

Round trips	3
Total loads, tons	12
Miles traveled	60
Miles per round trip	20
Loads per trip, tons	4
Ton-miles	120
Miles per gallon gasolene	5
Miles per gallon oil	152

COST RECORDS.

Investments.

Chassis, etc., complete	$5,200.00
Tire value	311.70
Total, less tires, to be depreciated.	$4,888.30

Fixed Charges—Yearly.

Interest on total investment (6 years) @ 6%	$ 182.00
Taxes and licenses	42.00
Insurance	300.00
Garage expenses	150.00
Total per annum	$ 674.00
Total per month (per day $2.21)	56.17
Total for period, 8 months	449.34

Variable Charges—Period.

Fuel at 29 cents a gallon	$ 706.44
Cylinder oil at 65 cents a gallon	52.00
Tires, 12,180 miles ($311.70÷12,000-mile life)	316.68
Depreciation, 12,180 miles ($4,888.30 ÷110,000-mile life)	540.79
Maintenance and repairs (estimated)	200.00
Total variable charges (per day $8.95)	1,815.91
Driver's wages (per day $5.83)	1,184.16
Total fixed charges	449.34
Total operating costs	$3,449.41

Daily Costs.

Cost per day operated	$ 16.99
Cost per mile traveled	.28
Cost per ton hauled	1.42
Cost per ton-mile	.14
Repair cost per mile, estimated	.016

New 'Bus Ordinance

The city council of Columbus, Ohio, is considering a new 'bus ordinance introduced by Councilman Worley and designed to replace the one now held up by injunction proceedings instituted by the 'bus owners. The old ordinance prohibits the operation of 'buses on streets occupied by street-car lines, but in the new one this feature is absent. The liability insurance required for each 'bus has been lowered from $35,000 to $15,000 with a maximum for any 'bus company of $75,000 regardless of the number of machines operated by it. Likewise the license fee is reduced from 1 cent to ½ cent per 'bus-mile, but other license and sanitation features remain unchanged.

Burch Leaves Truck Field

A. C. Burch, former president of the Signal Motor Truck Company and later vice-president of the Clydesdale Motor Truck Company, will be president of the Arrow Motors Company, recently incorporated, which took over the assets of the Maibohm Motors Company.

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Types of 'Buses and Their Legal Limitations

By R. E. PLIMPTON

ANY division of the types of vehicle used for 'buses must be arbitrary, but for convenience, we can consider them as applied in city, intercity and country service. The city 'bus is designed for use on good pavements. The seating capacity is high, 20 or more passengers, but high speed is not essential. A maximum of 15 miles per hour is often considered ample. Ability to thread through traffic and to move passengers quickly, on and off, is required. Ordinarily, overload capacity should be provided, so that standees can be accommodated during the rush hours.

The double-decker, a dense-traffic vehicle, has been developed highly through years of service in London and New York. The L-type 'bus of the Fifth Avenue Coach Company is distinguished by the low floor, the first step being at the curb and only one other being required to reach the floor of the 'bus. Increased seating capacity, without any increase of weight, has been secured in many recent double-deckers. A sample now operated in Chicago seats 69 passengers, with a total vehicle weight of only 157 pounds per seat. Previously, about 200 pounds per seat had been considered good practice.

Covered upper decks have been tried out in New York City and Chicago, but have proved popular only in bad weather. Double-deckers in London, England and Toronto, Canada, have been fitted with blankets for each top-deck seat, in the effort to build up the load factor. The so-called double-single-decker has been tried in England; the entire top deck of this vehicle can be detached for winter service, the stairs being removed and the hatchway closed by a trapdoor. One vehicle of this type has a capacity of 29 passengers as a single-decker, and of 54 passengers, half below and half above, when both decks are in use. However, the single-decker has by far the largest field as a city 'bus.

Long wheel-base to give loading capacity, a wide rear gage and a narrower gage on the front to give stability, a small turning-circle, low frame-height to give quick passenger movements as well as stability, long springs and special devices for easy riding are the more important features of a design that will be used widely in and about our cities.

It is of interest to know that experts on city transportation favor three sizes, for 21, 25 and 29 passengers, with a maximum frame-height of 26 inches. A smaller size, for 16 passengers, has also been proposed.

Most city 'buses have a central aisle with cross-seats on each side. In a modified form the seats near the service door are of the longitudinal type, thus providing a space for standing passengers or for those making short trips. This is being applied in short-haul work, while there is a tendency to use the unmodified cross-seat type in suburban work, and even for intercity service.

The intercity 'bus is smaller and faster than the city 'bus. From 12 to 20 seats are provided for the long runs of 20 miles and upward. These vehicles are known as stages in the West and particularly in California, probably because of familiarity with the term to designate a horse-drawn omnibus. The stage usually is built with three or four rows of seats running all the way across the body, each having its won side doors. It resembles an enlarged touring car, and, of course, that is what it frequently is. Comfortable riding is desired, rather than the ability to handle crowds. The floor level is kept as low as possible without decreasing the road clearance below 7 inches. The center of gravity is kept down to eliminate sway and undue wear on tires and wheel-bearings.

The average speed in western intercity service is high. Orders to drivers on a large system in California are to make 32 miles per hour on well-paved highways and 35 miles per hour is the legal speed limit. However, there are stretches where it is hard to keep down to this speed. For example, on the desert floor west of El Centro, California, a broad concrete pavement stretches away for 30 miles. There are no cross-roads and no habitations are in sight; there is no obstruction to view and very little traffic. With a high-powered car, the driver who will keep down to 35 miles per hour is unusual. The actual speed over such stretches is from 40 to 45 miles per hour and, occasionally, 50 miles per hour. The chassis and body should be of minimum weight, consistent with long life and durability. The improvements being made in highway systems will, it is believed, lead to the use of even lighter chassis.

The stage used in the West is, as a rule a rebuilt product. A high-grade touring car is bought second-hand, the frame is lengthened 4 to 5 feet, and a heavier differential, heavier springs and heavier tires are installed. It is realized that these vehicles are expensive, in both first and maintenance costs, since they are always in the "special" class, but Western operators have used them because they could not buy a chassis that would carry the long bodies under the heavy-duty, up steep grades and at high speeds demanded by Western operating conditions. One design at least is now on the market, and there are indications that others will be available soon for intercity service, not only on the Pacific Coast, but also in many other parts of the country where the large rebuilt touring-car has been used heretofore.

The country 'bus may start nowhere and end nowhere, as is said of some of them, but usually it runs through rural districts to a trading center or a point where connections can be made with some other form of transportation. This service does not require particularly high speed, but the 'bus should be able to keep going over poor roads, even when they are covered with mud or snow. Travel is light in this service; so the vehicles used are small. Touring-cars of five and seven-passenger capacity may be operated when the roads are particularly bad, giving way to larger 'buses, up to 18-passenger capacity, during the summer months. One trip a day is often the custom, to town in the morning and returning in the middle of the afternoon. Thus, the operator has the time to pick up light freight for delivery along his route; or he may be a star-route contractor for the Post-Office Department, in which case he may carry passengers and freight so long as his contrast is properly performed. Therefore, the country 'bus should be built to carry both passengers and freight. Most operators seem to use the standard passenger vehicle, car or 'bus, and carry the packages inside or outside, wherever there is vacant space. A space for packages is placed at the front of the vehicle in some designs, with the rear given over to seats.

A convertible vehicle would be particularly useful in consolidated school service, where many 'buses are now operated only 3 or 4 hours per day. The seats are removable in one design, so that the school 'bus can be changed quickly to a light delivery truck. Several combination bodies are on the market, designed to carry both passengers and express, but they have not been used to any extent by 'bus operators so far.

A transferable body has been suggested for school use, although it might be applied by the operator of country 'buses also. This would be mounted on a motor-vehicle chassis when the roads were good, but transferred to a horse-drawn vehicle, on wheels or runner, when they are impassable. The fact that this has been proposed seriously indicates the need for properly designed country 'buses. The field for them is enormous, and it should be possible to provide operators with a light, sturdy, economical 'bus for use during the 12 months of the year. Some engineers contend that good roads must come first. Yet 'bus service is being given on thousands of miles of unimproved roads. The life of the vehicles used is short, and some operators believe it economical to turn them in yearly for new ones. Here is a real problem waiting for automotive engineers to solve. The 'bus for city service is receiving attention from a large number of sources, but its country cousin is, as yet, almost entirely neglected. Before taking up the details of chassis and body used for the standard gasolene 'bus, other types that have been applied will be noticed. The gasolene-electric 'bus is used commercially in England, some 175 of the Tilling-Stevens chassis being operated in London, and others in the smaller towns. This consists of a gasolene engine direct connected to a dynamo. The latter is electrically connected to an electric motor, which drives a worm rear-axle through a propeller-shaft. The control is by a speed regulator of the multiple-contact type, operated by varying the resistance in the shunt field of the dynamo, and by shunting the series field of the electric motor.

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Storage-battery 'buses are used in Chicago for carrying passengers between the railroad depots and the department stores. One street-railway is now trying out a battery vehicle in short-haul feeder service. This 'bus is fitted with pneumatic tires and makes about 18 miles per hour in ordinary operation. The limited speed and battery capacity have worked against the battery-driven vehicles, although they undoubtedly have a field for short runs on good pavements.

The trolley 'bus, a road vehicle using the overhead system of the electric railway, is making headway in this country, as shown by recent installations in Toronto, Canada; Minneapolis, and Los Angeles. The system on Staten Island, New York, is to be extended by the use of 15 trolley 'buses now ordered for the New York City Department of Plant and Structures. Some of these will be used on the City Island line, in the Borough of the Bronx, New York.

Many of the trolley 'buses look like rail-cars fitted with rubber tires. However, there has been a tendency of late to follow closely gasolene vehicle design, thus using standard parts and making it possible to change from one type to the other by installing a gasolene engine and transmission apparatus.

A front-drive design has been worked out for the 'buses used in Leeds, England. The electric motors are under the front, and can be removed for repairs. It is claimed that this construction improves adhesion and traction effort, reduces the consumption of electric energy and makes possible a 14-inch floor level.

The steam-propelled 'bus is not in commercial operation at present, although several experimental vehicles are being developed for such service. The Clarkson steam 'buses, which were popular in London because of their speed, quietness and ease of control, stopped operation in 1919, mainly, it is said, because of the increase in fuel cost.

Laws and ordinances by the hundred, almost by the thousand, have been passed to "supervise and regulate" the 'bus. The safety and comfort of the traveling public are protected by a host of these regulations, many of which are more honored in the breach than in the observance. In common with other users of motor vehicles, the 'bus operator is limited as to weight, dimensions and speeds. In addition, he often must pay special taxes that influence the type of equipment.

To assure safe operation, presumably, the carrying capacity of the 'bus is limited. In some states, in New Hampshire, for example, the manufacturer's rating is taken as the legal limit, and no standing is permitted. New Jersey allows 50 per cent. of the seating capacity to be carried standing. Connecticut allows two more than the number of seats provided. The District of Columbia permits one standing passenger for each 1.5 square feet of floor area, this being calculated on the area remaining after deducting the space occupied by seats and 10-inch knee-room for longitudinal seats. In Maryland the maximum carrying capacity is the total length of seats divided by 16, except when the result exceeds the carrying capacity. This method, in effect, bars standing passengers.

An emergency door that can be opened from inside in case of accident is required in a number of localities. Other equipment insisted upon, for safety reasons, includes speedometers, inside lights, extra tires, skid chains, warning device and a fire protection device.

The requirements for heating, lighting and ventilation are usually indefinite; when enforced they depend upon the interpretation of the authorities. Closed 'buses in the District of Columbia must have a minimum temperature of 40 degrees Fahrenheit between November 1 and April 1. Interior lights of 2 candlepower or more, are demanded in Ohio and other states. In Maryland each 'bus must have two ventilators.

In many states the taxes are based upon seating capacity, and the larger vehicles pay more per seat than the smaller. Florida exacts from the 'buses used as common carriers a fee of $5 per seat for 7-passenger or less capacity, $7.50 per seat for 7 to 17-passenger capacity, and $10 per seat for more than 17-passenger capacity; in addition there is a tax of 75 cents per 100-pound of gross weight of the vehicle and the load. Connecticut and Maryland also have systems whereby the fee shoots skyward for the larger 'buses.

The regulatory authorities may even supervise the purchase of equipment, approve drawings and specifications and compel the improvement of those already in service. It is too early yet to judge what the result of this supervision will be. At present it seems to make for better 'buses. With wise regulation and with improved highways that will permit lighter vehicles and more economical operation, the 'bus, already with such a wonderful development, will have an even more wonderful future as an instrument of transportation.

New Autocar Branch

The Autocar Company has opened its new factory branch building in Newark, New Jersey. It is one of the largest service stations of its kind in the country, with 77,000 feet of floor space on the street level. In addition to sales and service facilities, it will provide warehousing space and a reconditioning department for the entire Greater New York district. The new building, which is located on Frelinghuysen Avenue, covers a city block with entrances on four streets.

Canada May Tax Motors

Canada is considering new means for increasing the revenue necessary to meet its budget requirements and, among other sources of income, a tax of 5 per cent. on motor vehicles selling up to $1,200 and 10 per cent. on those selling for more has been proposed.

The Van Wheel Corporation, Syracuse, maker of cast-metal hollow spoke wheels, has moved its factory to Oneida, New York, where operations have been resumed on a larger scale. The offices of the company will remain in Syracuse for the time being. T. G. Meachem, former vice-president of the New Process Gear Company and president of the Palmer-Moore Company, is president of the company.

The Associated Motors Merger

Facts regarding the organization of the Associated Motor Industries are contained in a circular issued by the Union Trust Company of New York which is offering a $6,000,000 bond issue of the new company. Seven and one-half per cent. 10-year bonds, secured by a first mortgage, are provided for. The following concerns are named as members of the merger: the Kentucky Wagon Manufacturing Company of Louisville, the National Motor Car & Vehicle Corporation of Indianapolis, the Traffic Motor Truck Corporation of St. Louis, the Recording and Computing Machines Company of Dayton, the Covert Gear Company of Lockport (New York), the Jackson Motors Corporation of Jackson (Michigan), the Saginaw Sheet Metal Works, and the M & T Corporation of Boston. The new company, which was incorporated in Delaware last September, will make a line of trucks under the traffic name ranging from 1 to 3½ tons and a line of passenger-cars under the National name consisting of "fours, sixes and de luxe sixes." The Kentucky Wagon company is now in the bankruptcy court. According to the bank's circular the new company has fixed assets of $19,816,448.46, made up of current assets of $1,682.26 and land, buildings and machinery of $1,288.35 for each $1,000 bond. The Jackson and Traffic concerns are the only ones whose assets have been transferred to the new company, although the assets listed above would seem to include a combination of all the assets of all proposed members of the merger.

Kirke Moore with Dana Group

D. Kirke Moore, one of the industry's most widely known parts merchandisers, has joined C. A. Dana as supervisor of sales for all the automotive divisions in the Dana group. These include Spicer Manufacturing Corporation, Parish Manufacturing Company, Sheldon Axle & Spring Company and the Salisbury Axle Company. His headquarters for the time being will be in Cleveland. Mr. Moore's past record in the trade not only bespeaks the importance of his acquisition by the Dana interests, but also is particularly significant at this time in view of the general understanding that the group is in process of being strengthened by further alliances of importance.

Mr. Moore's career has brought him recognition throughout the entire trade. He first came into prominence as one of the organizers of the American Distributing Company, manufacturers' selling agent for a number of products extensively used in the trade. He remained at the head of that organization for years. In January, 1912, he joined the Weston-Mott Company as general sales manager and later was also made director of sales for Northway Motor & Manufacturing Company and the Jackson, Church & Wilcox Company. Through his connection with the Western Spring & Axle Company, he came into the Standard Parts organization in the summer of 1917 as manager of the bearing and axle departments, resigning early in 1920. He rejoined the American Distributing Company in May, 1921.

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Fixing Depreciation Rates Advised by Commerce Body

PLAN WOULD FACILITATE TAXPAYING

A plan to assist manufacturers in the different lines of industry in determining depreciation for tax purposes has been worked out by the Fabricated Production Department of the Chamber of Commerce of the United States. Use of this plan is being urged by the department. The plan provides that "within the trade association of a given industry a depreciation committee should be appointed, consisting of from five to seven engineers, cost accountants and plant superintendents selected from the industry.

"Such a committee should prepare a questionnaire providing for a listing of the units of utility, the cost of same, estimated scrap value, and years of useful life," says a statement of the plan. "Before sending the questionnaire to manufacturers of a given line certain preliminary points should be cleared up, such as:

"(a)—Method of charging maintenance, renewals and depreciations: It will not do merely to average the various estimates of useful life provided by the manufacturers of a certain line, because the methods of charging maintenance, renewals and depreciation may not be the same. Thus, one manufacturer may charge as maintenance all repairs and partial renewals. By this method the laying of a new roof on a building would be charged to maintenance. Another manufacturer may charge to maintenance only such items as tend to keep the property in the same general condition. The laying of a new roof adds to the life of the asset and accordingly would be charged to the depreciation reserve. The first method gives a high maintenance rate and a low depreciation rate. The second method gives a low maintenance rate and a high depreciation rate.

"(b)—A statement of elements of depreciation: Accompanying the questionnaire should be a statement of the elements entering into depreciation, wear and tear, and obsolescence. Wear and tear is defined as 'that uniform wear-out and decay which repairing is unable to check' and it is dependent upon the amount of use, the amount of care, the quality of the installation and the natural hardships to be overcome. Obsolescence arises from 'an inability to compete in kind, in quality or in cost of desired results with later forms of the same utility.' Also there is that change in demand which displaces the whole life of equipment. It is important that the depreciation committee secure sufficient facts for it to come to a conclusion as to which is the factor, obsolescence or wear and tear, determining the useful life of a given unit of utility. Certain machines are not given the opportunity to wear out, they are replaced so rapidly because of improvements in the art. Clearly obsolescence is here the determining factor.

"(c)—Determining stated conditions of use: Guide rates of depreciation for an industry presuppose stated conditions of use—the number of days of operation in a year, the number of hours of operation per day, a standard of maintenance, external conditions such as climate and road, etc.

"With the normal conditions of use stated, it will be possible to provide for variances thereof upon a scale of percentages. Thus, during the war additional rates of depreciation were allowed for overtime operation, and when depreciation can be based on an incident of production, capacity, or performance, it may be feasible to scale the rate of depreciation for subnormal production.

"Upon a return and digest of questionnaires, schedules should be prepared showing items of utility, cost, scrap value, and useful life. These schedules should be submitted to the manufacturers for criticism. Upon revision a conference should be arranged with the experts of the Treasury Department that the depreciation data may be checked by them. When so checked the rates of depreciation should be promulgated as guide rates for the industry, it being thoroughly understood that such depreciation rates shall be merely suggestive and not mandatory and that in the last analysis each concern must determine the depreciation allowance out of its individual experiences."

The advantages of such an investigation and study to determine basic rates of depreciation are fully set forth in the foregoing. First, it will tend to minimize friction between the taxpayer and the Treasury Department; second, it will give the business man more definite information than usually exists as to what is properly chargeable by way of depreciation; third, it will tend to eliminate cost inequalities that arise from unjustified discrepancies in depreciation rates and depreciation methods.

Group rates for wear-out depreciation were successfully established in 1920 by the National Association of Ice Industries in coöperation with the Treasury Department. The following are the rates agreed upon after an exhaustive investigation:

For wooden natural ice houses and wooden storehouses	6 4/10%
Ice houses, harvesting and hoisting machinery, including conveyors, hoists, merrimacs, basin saws, etc., and power plants for same, elevators	9 1/2 %
*Machinery of steam-driven manufacturing plants	7 1/10%
Machinery of electric-driven manufacturing plants	7 3/10%
Frame buildings	5 %
Brick buildings	2 1/2 %
Concrete buildings	2 %
Horses	15 4/10%
Harness	16 2/10%
**Wagons and other horse-drawn vehicles	14 3/10%
Automobiles	22 5/10%
Motor trucks	22 2/10%
Sundry delivery equipment	15 %

*In case of bad water, this figure to be increased up to 7 6/10% as a maximum.

**In case of the Southern States, where a different grade of vehicle and horse is used, these figures become 20 per cent for vehicles.

It is also recommended that the following line of demarcation be established on which to base the above rates of depreciation. Wearout depreciation and maintenance are to be separated according to the definition of wearout depreciation, which is that loss of original usefulness which has gone so far on any "Unit of Utility," beyond the ability of repairs to correct, so as to make necessary the complete replacement of that "Unit." By maintenance (synonymous with repairs) is meant the correction of some local defect of a "Unit of Utility" by bringing the defective portion in the easiest way, into practical parity with the general condition of the remainder of the "Unit." By the definition of a "Unit of Utility" is meant a single purposed mechanism or part of a construction, subject to such like conditions of use, that it would naturally be repaired or replaced as a unit.

Per Mile Tire Costs Are Lowest in Thirteen Years

REDUCTION IS MORE THAN 75 PER CENT

The cost of motor vehicle tire service has been downward almost constantly since 1910, with one or two temporary increases.

Typical instances show that the cost has decreased generally more than 50 per cent. and in some instances is only 16 per cent. of the tire cost in 1910. This reduction is due to a combination of lessened costs and an increase in the number of miles of service given.

A typical 33x4-inch pneumatic tire in 1910 cost the consumer $50.20; the same tire today costs $26.80. A 30x3½ in 1910 cost $33.90, today $10.95. A 35x4 tire in 1910 sold for $82.70 and today for $44.60.

The tire which in 1910 cost $50.20 seldom gave more than 3,500 miles of service; the same tire today will give 8,000 miles. The cost a mile in 1910 was 1.44 cents, today .33 cent.

The course of consumers' tire prices since 1910 to date is shown in the following tabulation of three representative sizes:

	33x4	30x3½	35x4
Present	$26.80	$10.95	$44.60
1920	29.35	15.25	49.55
1919	33.35	17.61	55.55
1918	39.25	23.50	65.35
1917	29.50	17.95	49.95
1916	25.65	15.60	43.45
1915	23.30	14.20	39.50
1914	33.05	22.10	55.50
1910	50.20	33.90	82.70

The cost of tires to the consumer, in cents a mile, on the basis of usual tire guarantees, is shown as follows:

	Miles.	33x4	30x3½	35x4
Present	8,000	.33c	.14c	.56c
1920	7,500	.39c	.20c	.66c
1919	7,000	.48c	.25c	.79c
1918	7,000	.56c	.33c	.93c
1917	5,000	.59c	.36c	1.00c
1916	4,000	.64c	.39c	1.09c
1915	3,500	.67c	.41c	1.13c
1914	3,500	.94c	.63c	1.59c
1910	3,500	1.44c	.97c	2.36c

Tire production in the United States has increased from 2,400,000 in 1910 to the current rate of more than 30,000,000 annually, as shown in the following table:

1922	*16,000,000	1915	12,000,000
1921	26,000,000	1914	8,500,000
1920	32,000,000	1913	6,000,000
1919	24,000,000	1912	5,000,000
1918	26,000,000	1911	3,000,000
1917	25,000,000	1910	2,400,000
1916	18,000,000		

*Estimate for first six months.

Creditors of the Gramm-Bernstein Motor Truck Corporation of Lima, Ohio, have agreed to extend for five years the time for payment of their claims under a plan which has been worked out by a creditors' committee.

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Motor Transport for Railways

By ZENAS W. CARTER

THE electric railway operator is in the transportation business. He uses steel rails and electricity as his work tools. Theoretically he is interested only in steel rails and electricity. Commercially and practically, however, he is in the transportation business, and the "rubber urge" is a feature of the transportation business. It affects both freight and passenger business. Motor trucks and 'buses are here to stay. Their use is rapidly increasing everywhere and on every highway. They are essentially and actively an important part of the transportation business of to-day.

Thus, as a transportation man the electric railway operator finds his attention centering more and more upon the problem of coördinating motor trucks and 'buses with his electrical operation. Just how this may be done to best cater to public demand to "ride on rubber" is an individual problem in each particular case. No general rule can be set up which will fit any two cases. However, this much can be stated most emphatically: motor trucks and 'buses must represent an ultimate economy or they are a distinct liability.

This question of the economy of trucks and 'buses when used by electric railway companies has too many factors for any one to offer much more than a statement of some of the operations already under way. For instance, six months ago an officer of one of the Ohio electric railway companies made the statement that they were not interested in motor 'buses. At the present time this same company has determined that it will be economical for it to purchase, and its order has been placed for five special motor 'buses to be operated on a highway paralleling the company's present lines.

The decision was made from two angles entirely uninfluenced by the question of direct profit. In the first place, if it had not initiated 'bus operation covering the territory someone else would have started this service. Their franchise was in jeopardy because the public in the territory were not adequately served by the present electric service. Another factor was lack of capital to make the electric extensions, and their belief that the cost of additional track laying and equipment would be too great to prove a profitable investment at the established rate of fare.

Another company, the Northern Ohio Traction Company of Akron, found by careful study and survey that there was an opportunity to keep competition from its electric lines and at the same time operate 'buses at a profit by initiating two 'bus lines, generally paralleling its trolley service at a distance of several blocks off track. On one of these lines there was already partial "jitney" competition, but this will soon be entirely eliminated by the action of the trolley company in purchasing motor 'bus equipment and by granting transfers from 'bus lines to the trolley-cars.

An important factor in both these cases is also the opportunity offered by motor 'bus use to test the volume of traffic which may be secured in advance of making an expensive installation. Furthermore, should it be necessary later to abandon the lines or should it prove more profitable to install electric trolley operation, the 'buses will have a large salvage value or may be at once transferred to other service. These two cases are cited particularly to illustrate that the question of economics in electric railway operation is not necessarily a question of making a specific profit on a definite installation of motor equipment.

On the other hand, there are hundreds of motor 'bus lines in operation in the United States in territory which was not being served by either the electric or steam companies. These lines are delivering a profit to their operators. In some cases, as in California and a few of the Middle West cities, the patronage has already proved so profitable that passenger and transfer stations have been supplied by the 'bus operators.

It is reasonable to assume that this business belonged to the transportation companies, either the steam or electric operators. As it is in outside hands, it is evident this transportation business was lost to the regular transportation companies largely through lack of interest in making their surveys for motor 'bus operation. Several of the larger electric and steam railway companies have, however, checked over their prospective fields and are now actively in the business of catering to the public demand.

At Milwaukee the Milwaukee Electric Street Railway Company made surveys which have justified its purchasing and operating 20 or more 'buses in coördination with the electric service. This action has enabled it to conserve completely its investment in electric operation and to capitalize the 'bus demand in making extensions and in supplementing and supporting normal service. In this way it has met conditions and fully satisfied the public's demand for additional service.

Among the many street railway companies that have initiated 'bus service in coördination with electric property operations are the United Electric Railways Company of Providence, Rhode Island; the Pennsylvania & Ohio Electric Railway Company of Youngstown, Ohio; the Rockford & Interurban Street Railway Company, Rockford, Illinois; the Connecticut Company at various places in Connecticut; the Public Service Corporation of Newark, New Jersey; the street-railway companies of Baltimore, Washington, Tulsa, etc.

Several of the New England companies have already initiated 'bus service and in California the electric lines are operating 'buses as individual companies in coöperation and in coördination with independent 'bus companies in order to issue through tickets for long trips. At Niagara Falls the Gorge Railroad Company supplements its service by a 'bus; the Escanaba (Michigan) Power and Traction Company, and the Northern Texas Traction Company of Ft. Worth are also now on the list of users of both electric and gas motor 'bus transportation. At San Francisco and Seattle the municipal companies are coördinating both types of service in carrying passengers. As an evidence of the very rapid increase in the use of motor 'buses throughout the United States and in support of the statement that the public is enthused over the flexibility, convenience, economy and utility of the motor 'bus, it is most interesting to cite the fact that one manufacturer of 'buses has received orders for over 350 of a new model which was first announced to the electric railway and motor 'bus operators on January 1, 1922.

An independent 'bus operator, Frank Martz, of Plymouth, Pennsylvania, carried more passengers per 'bus in 23 'buses which he operated in Wilkesbarre, Pennsylvania, in 1921 than were carried by the same number of 'buses operating on the Fifth Avenue line in New York City. The figures are: For Wilkesbarre, 183,891 passengers per 'bus; for New York City, 174,192 passengers per 'bus. In fact, the total passengers carried by Mr. Martz in the 'buses which he operates in the Wilkesbarre, Pennsylvania, territory was well in excess of 4,000,000 during 1921. Mr. Martz began hauling passengers in and about Plymouth, Pennsylvania, in 1910, and he reports that several of his 'buses have passed the 300,000-mile travel mark, that 8 have run more than 200,000 miles and that 20 have run more than 100,000 miles each. Throughout the United States there are dozens of these independent 'bus operating companies, which have had a period of existence amply justifying the statement that motor 'bus operation is an economic transportation.

MENTION should also be made of the rapidly increasing use of motor 'buses of special type to transport vacationists, tourists and business men into scenic and resort territory previously inaccessible on account of the expense of establishing either electric or steam transportation on account of physical contours of the country and the seasonal feature of the traffic.

Motor 'buses may be driven over inexpensive highways and into hilly territory serving seasonal traffic and transferred to other territory at will. This frequently makes an operation very profitable through using these 'buses in service in the North in summer and in the South in winter.

While at the present moment, in some isolated instances, the advent of the motor truck and the motor 'bus may seem to in-

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itiate a new competitive unit and ultimately there may be numbers of lines of steam trains, electric cars and motor 'buses serving in the same community, the motorized vehicle will always be used for a type of economic transportation which, in general, is not competitive with either steam or electric operation. It is an important fact that the motor on the highway offers the opportunity to supply the public with both local and express service operating over the same route, while this is impossible on single rail line.

It is very probable that a great many electric railway companies could profitably operate 'bus lines paralleling their rails, especially in congested centers, operating the 'bus lines for express service and using the electric service almost entirely for local stops. In many cities it would be possible to secure 10-cent fares for such improvement in service and thus turn into a very profitable operation a franchise which carried so much long-haul traffic as to be otherwise unprofitable at the usual 5-cent fare. In other cases such a service might solve a rush-hour congestion problem profitably where the addition of extra cars would only tend to slow up movement and increase congestion.

Another field for the use of 'buses in conjunction with electric line operation is in territory where development has spread the area served until a large percentage of possible short-haul passenger business is lost on account of the distance the passenger must walk to reach the trolley. The use of 'buses covering such a section over what might be called a curved or bow route paralleling the trolley service at some distance but not operating on exact trolley schedule would often prove distinctly profitable and preserve the existing company from possible competition.

The picking up and delivery at curb, whether in urban or in congested city territory, is a psychological element to consider in the opportunity to increase short-haul traffic.

AN INTERESTING phase of the great increase in the use of the motor 'bus is that the public has, through its ownership of motor cars, been educated to "ride on rubber." Probably this, as much as anything else, is the real reason why men, women and children will jam into an overcrowd the "jitney" and seem to prefer it in many cases as a means of transportation, even in places where the "jitney" service is paralleled by the electric railway.

It is largely the people who do not own cars who prefer the "jitney." It seems to be a vehicle in which the rider is more intimately a partner than in the trolley. The psychology of the entire situation is a vital factor. This is the "urge" back of the increasing use of 'buses.

In the motorization of our highways the motor truck has been ranking next to the passenger-car in importance up to the present time, but it is very probable the use of the motor 'bus will soon exceed even the use of the truck in revolutionizing our highway transport. In this it is very pertinent to comment on the subject of agitation in some sections to have the motor vehicle more heavily taxed. Fundamentally, this is moving in the wrong direction, except in so far as all vehicles using the highways may be taxed in proportion to their proper share of maintenance. As figures given later will show, this is already accomplished. The motorization of our highways is itself the economic force which has compelled the betterment of our highways and to increase taxation of this special class group would seem to tend to drive backward instead of forward. While the motor vehicle automatically demands good roads and the use of motor vehicles increases in proportion to the improvement in the mileage of good roads, the all-important point is that the mass citizenship is bettered by the improvement of roads, as it is an old adage that civilization and development follow improvement of transportation facilities.

Even the interests of the steam and electric roads may ultimately be served better by low taxation of motor vehicles than by high taxation. The steel rail carriers, both steam and electric, are the transportation industry. Sooner or later they will own and operate their own motor truck and motor 'bus lines, probably using trucks very extensively in store-door delivery, which is beginning to be demanded by merchants and wholesalers, and motor 'buses for the economic handling of their short-haul and local passenger business and to supplement and, probably in many congested districts, to support or supplant already established lines. In fact, as there are now dozens of electric railway and steam railway companies who own and operate both motor trucks and 'buses, they are just as much interested and will be more interested in the future in keeping down the taxation on motor vehicles as will the makers of motor equipment.

For this reason, it seems fitting that all transportation interests—the electric railway and steam interests as well as the motor interests—should refrain from agitating for taxation which may ultimately tend to become a boomerang tax and prove burdensome to their own operations. Especially is highway tax agitation futile when it merely tends to widen the transportation cost breach existing between consumer and producer and to reduce the volume of goods which may be transported by motor for short hauls, thus increasing the unprofitable short-haul tonnage to be handled by the railways.

The improper use of highways by overloading motor vehicles should be denounced and effective legislation enacted to curb this practice; but the statement made by Daniel Webster at the Rochester (New York) Agricultural Fair on September 24, 1843, is just as true to-day as then: "That one great duty of the government is to see that the products of our rich soil and industrious labor may be easily, speedily and economically transported to the place of consumption and sale." Certainly the motorizing of our highways is a big step in furthering that end and the government might properly subsidize the increased use of the motor vehicle rather than penalize it.

The use of the motor truck by the electric railway service department has naturally been proved economical as a factor in trolley operation much quicker than the use of the motor 'bus by the passenger department. In this service for public utility corporations there are as many different kinds of uses for the motor truck as there are different types of work to be done. They are so varied it would be impossible to name them all.

A few statements of their service to the electric railway industry will suffice to suggest the possibilities: First in importance is undoubtedly speed in repair work. The public will forgive almost anything except delays. When a break in a regular service occurs almost anywhere in the country the first call is for a motor truck repair outfit. Day and night they are kept on guard. Emergency tower trucks speed at 25 to 50 miles per hour to repair line breaks. In one of the Georgia Railway & Power Company's substations, for instance, a motor truck was used to move a 20-ton converter into position in the substation.

WHERE cable is to be strung on lines or go into conduit, the truck equipped with a power winch is indispensable both for use in loading and unloading the reel at the warehouses and for paying out the cable for drawing it through conduit in the field. Poles are carried into the field. Frequently the power of the truck or the winch is used in setting them up greatly conserving the number of men required for this work as compared with the old method. Cross-arms, insulators, transformers, tools and men all accompany the construction, often enabling one crew and one truck to perform work formerly requiring a number of teams and two or more crews.

Where excavation is required trucks are always on the job with tools, materials and men—dependable in all weather, durable through merciless punishment and most economical as well.

While series of wires are to be strung on pole lines some companies have rigged the trucks with special racks, feeding from eight to ten wires at a time, carrying all cross-arms and insulators required at the same time. Many times trucks have been used by power companies to move buildings on their property. Electric railway companies in a number of cases have had cranes mounted on motor trucks to assist in construction and repair work and to give speedy aid in removing obstructions if a line is blocked.

Motor trucks are used for patrol work, to haul fuel, to transport men and material on every kind of work, and anyone familiar with the field needs of electric trolley can specify dozens of other uses.

In addition to the tremendous value which the motor truck represents in the service departments of the electric railway field, there is a use of trucks for supplementary freight service which may soon grow into large proportions. That is for the extension of electric railway freight lines into off-line territory as has been inaugurated by the Cincinnati, Aurora & Lawrenceburg Electric Railway Company. Finding themselves blocked for freight delivery and receipt at a point located 5 or 6 miles from the business center of Cincinnati, the company officials have adopted the use of the demountable body or uniform container in use by the steam railroads of Cincinnati. They have established a

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service which enables them to meet steam railway competition and to give store-door delivery. Arrangements were made with the Cincinnati Motor Terminals Company to supply them with its specially designed container truck bodies and to supplement service from their outside terminal to the heart of the business center, by using these truck bodies on flat-cars instead of using box-cars for freight. By this system, the truck bodies are immediately removed from the flat-cars of the electric railway company just as soon as they arrive at the terminal. The Motor Terminals Company immediately takes them on its trucks, of which a large fleet is maintained in Cincinnati for steam railroad service. This enables the electric railway to make delivery to its off-track down-town terminal within a few minutes after the arrival of the flat-cars at the outside electric terminal. Or, when the consignment is in quantity, it may be delivered direct to store-door or warehouse of consignee in record time and without rehandling.

By this same method, the container bodies are filled for out-bound service at the off-track terminal in the heart of the city and transferred by motor truck to the electric terminal. Delivery to local way stations is then made direct from the container bodies carried on the electric railway's flat-cars. This system not only saves much loss from damage, theft and misplacement, but it relieves the trolley company from much extra checking, rehandling, etc., and enables the trolley line to provide a service excelling that of any other transport. This system also is less expensive than direct motor truck haul in this case. A somewhat similar operation, using trailers, is in service in Chicago, as part of the freight system of the Chicago, North Shore & Milwaukee Railroad.

As the question of contribution made to the public purse is a very important feature in any consideration of the subject of motorizing our highways, it is interesting to check up some of the dollars-and-cents facts. They are all very startling. For instance, what man in the electric railway field not definitely interested in the motor industry is aware that the Internal Revenue Department of the United States received from the motor industry in the year 1921 the amazing sum of $115,546,299.31 as excise tax alone, and, in addition, the sum of $1,776,493.88 as excess tax on passenger vehicles for hire? These millions are all in addition to the normal income tax and excess profits taxes paid by the manufacturers out of their profits as manufacturers.

In comparison, this excess tax alone represents a sum almost one-half as much as the government received in returns from the tax on the transportation of all freight, all express and all passengers by all the steam railroad and electric railway lines in the country. This motor industry contribution represents almost five times the government collections in taxes on telephone, telegraph and radio messages.

Corporation returns distributed by industries are not yet available for the past year, 1821, but if the motor vehicle manufacturing returns merely equaled those of 1919 (and with almost 2,000,000 more vehicles registered last year than in 1919, it is reasonable to presume they exceded 1919), then the motor industry contributed in income tax and excess profits tax, including motor vehicles and automobile bodies but not including the returns from the tire and accessories industries, a total of $79,675,544. This 1919 tax paid was four times the total tax paid by all the manufacturers of electric machinery, stationary and marine engines, refrigerating machinery, etc., combined.

From the Department of Agriculture, Bureau of Public Roads, I have a tabulated sheet brought up to date and covering the year 1921, which shows that the various state governments either as state revenues or as highway department revenues, received the grand total of $122,478,654.34 as gross motor vehicle and license revenues for the year 1921. This tremendous sum, if applied solely to maintenance of highways (not new construction) would pay for all the maintenance necessary to keep our highways in perfect condition after they were initially paved with proper pavement to serve reasonable traffic, as it is estimated that 10 per cent. per year of original cost will maintain any properly designed and properly constructed pavement for any class of traffic. This vast sum of over 122 millions would thus maintain an expenditure of over $1,225,000,000 for new pavement. No such sum has been expened for pavement, even if all the expenditures of all our states were combined with the contributions of the United States government for highway work.

Taken as a total sum contributed as income tax, excise tax, or as license revenue, the automobile, motor truck and motor 'bus provided a grand total of over $317,700,447 of revenue to the state and national governments in 1921. It is a fact that this was indirectly contributed by every user and owner as well as by the manufacturer, but the great total is an emphatic argument to direct universal attention to the extraordinary progress this country has made in local transportation in a decade. For, with few exceptions, all motor vehicles, whether pleasure car, motor truck or motor 'bus, is local.

The total registration of motor vehicles for 1921, as shown by the tabulations of the Bureau of Public Roads, was 10,465,995. Of these, 9,342,844 were passenger-cars, 982,604 were trucks, 50,547 were taxi cabs and 'buses. These figures are startling. They are very important in interesting the electric railway industry when compared with the statement from the January 7th issue of the Electric Railway Journal to the effect that there were 149.79 less miles of electric rail in service in 1921 than in 1920 and that the total of cars and locomotives in service was only 106,385 in 1921 as compared with 106,688 in 1920.

In the present situation, as it relates to the use of the motor truck for carrying freight in coöperation with the electric or steam railway and as it relates to the use of the motor 'bus or the rail 'bus for carrying passengers in coöperation with either, this new means of local transport offers an opportunity. It is an opportunity for the railway interests to be carried along into this new field of transportation. Sound, careful, intelligent investigation will easily disclose to the interested railway operator that these almost 11,000,000 vehicles can not now be superseded by systems of either steam or electric transportation. More careful analysis will also undoubtedly show that in a majority of cases, not only the passenger-cars, but the motor trucks and motor 'buses as well, have been used to take care of business and personal demands for a class of transportation which either could not be cared for by the steam or electric units or for a class of transportation which it would be actually unprofitable for the older system to handle at the rate which is profitable to the motor vehicles.

The motor truck for short-haul freight service offers the opportunity to pick up freight and make delivery with just two manual handlings of the goods as compared with four handlings, if the goods must be loaded into and taken from a box-car. In passenger transportation the motor 'bus offers a system supremely flexible which may be coördinated profitably with a system rigidly inflexible.

Pierce-Arrow Showing Profit

Current operations of the Pierce-Arrow Motor Car Company are showing a slight profit, indicating that an addition to surplus may be reported for the quarter ended June 30, for the first time since September, 1920. The loss of $25,226 for the three months ended March 31, last, was the smallest deficit for any quarter in the last year and a half.

While passenger-car sales are encouraging the demand for Pierce-Arrow trucks is small. This is mainly responsible for the poor earnings.

Since the abandonment of the plan for merging Pierce-Arrow and Lafayette Motors the Pierce-Arrow management has made no further plans. There is no desire to negotiate a consolidation with some other motor company simply to enlarge the organization. The acquisition of Lafayette Motors would not have been considered if it had not offered the only means through which the services of C. W. Nash might be secured.

Aside from sales stimulation Pierce-Arrow's important problem is its bank debt. Notes payable aggregate $8,000,000 on which interest charges are upwards of $500,000 annually. How heavy a burden this makes is indicated by the fact that annual dividend requirements of the $10,000,000 8 per cent. preferred stock outstanding total $800,000.

The directors have discussed plans for issuing notes or bonds to retire bank loans, but no definite proposals have been put forward. It is expected that a favorable opportunity will be afforded for new financing before the end of the year.

W. C. Kiefer has been promoted to the office of service manager of the engine division of the Buda Company, succeeding R. A. Kiken who has resigned to join the Motive Parts Company of America, Chicago, as sales manager of that institution. Mr. Kiefer has been with the Buda Company for seven years and for some time has been acting as assistant service manager.

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Repair Man Offers Complete Maintenance Service

By J. R. COMPTON

WELL-INFORMED owners of motor trucks and passenger-cars in New York City, including such firms as the General Motors Corporation and Gimbel Brothers, have made arrangements with Ralph C. Rognon & Company to handle the maintenance and repair work on their machines. In this fact, and the growing demand on Rognon's facilities, is to be seen the proof that his habit of looking at his service from the viewpoint of the owner is a successful one. His establishment at 546 West 55th street is growing, new equipment being on the way, including such rare machines in service work as special balancing instruments for engines.

Mr. Rognon, who has been long in this branch of the motor trade, having been at the head of the service establishments of many of the leading metropolitan branches, has put into his policies the idea that the owner of a machine wants it maintained at full efficiency for its entire life. This program, when coupled, as it is, with expert workmanship and proper pricing, makes a great appeal. That is why Mr. Rognon, who has just started on a campaign that will announce his work to New York owners, already has secured contracts from large operators who were quick to learn of the new station and desirous of availing themselves of its facilities.

In a large measure the principles used are the outgrowth of the Automotive Service Association, of which Mr. Rognon was a leading organizer, and the president for three years.

"This new maintenance program," he says, "opens the field for a new industry whose chief object is not the sale of vehicles, but the sale of legitimate profit to the repairman and a fair, honest price to the owner. During the experimental stage of the industry, service stations were operated as a bumper between the manufacturer and the owner. A great many complaints were adjusted in favor of owners as a matter of sales policy with the result that owners acquired the habit of unjust demands. This condition resulted in 'free service' and a sort of a see-saw affair between the owner and the service station, the owner making frequent visits to the station during its warranty period and afterwards only when he was forced to from a breakdown.

"The service stations of the manufacturers and dealers have been maintained as an adjunct to their sales departments. Their chief motive has been the elimination of complaints on the improper functioning of new machines. The majority of these stations are at present servicing less than 20 per cent. of the vehicles in their territory, whereas, if this misunderstanding did not exist and it was looked at from a maintenance angle as a real aid to owners, they would be doing the work in a large metropolitan district cheaper and better than any one else. Any repair shop, whether an official service station or a large independent shop, which has modern machinery and up-to-date methods must, in order to be successful, gain the confidence of the public by selling maintenance service and acting as an aid and adviser in the solving of the owners' transportation problems. Owners should learn to buy the right kind of repairs at the proper time. The repair shop has always been regarded by the owner as a place to have his machine fixed only when he has a breakdown. On the other hand, the repairman has been so busy fixing breakdowns that he has not had time to sell a maintenance service which would prevent trouble. Records covering a period of five years in one of the largest service stations showed that over 60 per cent. of the job tickets were marked 'neglect' as the cause of breakdowns.

"The analogy between the motor vehicle and the human body is almost perfect. The tendency of modern medicine is directed to prevention of disease. Everybody knows that a sick man needs attention. Experience has taught us that the well man needs it also, so that he will not get sick.

"The foremost question in the minds of owners is 'Where can I get my machine and how much will it cost?' Repairs can be sold on a commercial basis, provided they are sold with a maintenance program in view. If vehicles are properly lubricated and adjusted at the proper mileage intervals, annoying and costly breakdowns can almost be eliminated. Experience has proved that owners will not periodically lubricate and adjust their machines and should learn to purchase this class of repairs.

"There are three classes of repair work; namely, maintenance, general repairs and rebuilding.

"Maintenance is reclassified as proper lubrication and adjustments. These comprise the proper application of lubricants to bearing surfaces, as draining and cleaning the crank-case at fixed mileage intervals, replenishing with new oil, repacking wheel bearings and universal joints, filling transmission and differential cases and so forth, thorough examination of vital parts and correction of external defects—in short, the readjustment of all external parts not in perfect working condition.

"General repairs include necessary repairs due to mechanical defects, caused by wear, abuse or accident; reconditioning due to accident or breakdown; and are also vitally important as an adjunct to proper maintenance, through taking up bearings, grinding valves, removing carbon, adjusting gears to proper mesh and adjusting wheel bearings, which are representative operations in the making of internal adjustments.

"Complete rebuilding should take into account nothing less than the making of complete repairs. This involves the complete disassembling and rebuilding of each individual unit. The machine must then be built up from these rebuilt units by productive methods similar to those employed by the manufacturer. This class of work offers a tremendous field for the rebuilding and painting of vehicles and is the answer to the used-car problem."

The practical operation of these principles in the Rognon building has resulted in several interesting departures from conventional practice. One of the first things that strikes the eye of the owner driving into the garage is a series of signs. Each kind of work is given a department of its own, with a sign naming it, and more than that, bearing in big letters the name of the head of the department. These men, while their relation to the company is that of employees, are given full credit for the conduct of their special divisons. This serves to instill into them more than the usual amount of interest in their work, for they know that what they do is, in effect, tagged with their names, and that their craftsmanship redounds to their own credit as much as to that of the establishment.

Much original thought is evidenced in the various activities. For example, the bearing shop has developed a new method of fitting babbitt bearings, whether they be bronze-backed or die-cast. They are cast in the shop to rough dimensions, then bored and oil grooves and holes cut. The engine main bearings are clamped in place with proper allowances for shims, and then line-reamed with special tools to their accurate diameters. This assures perfect alignment of bearings, correct timing-gear mesh, and proper alignment with the cylinder bore. Connecting-rod bearings are similarly lined-up in a jig, so that minor twists in the rod will not affect the relation between the wrist-pin journal and the crankshaft journal.

In addition to this mechanical work in rebuilding engines, consideration also is given to the subject of balancing of compression, something that usually is attempted only in the very finest racing engines.

Mr. Rognon feels that there is as much need for grinding in of piston rings as there is of grinding valves, and that, as a matter of fact, there is no use grinding valves at all if the seal between piston and cylinder is poor.

Another new method in the shop is that of greasing, involving the use of a special lubricating compound sprayed by compressed-air into all friction surfaces, including spring leaves. The machine is driven up on "horses," and all noise-producing points on the chassis and between the chassis and body, and even fender joints, door hinges and windshield posts are sprayed with the special mixture, in which grease and graphite play prominent parts. This operation is a standard one, and is offered at a flat price of $11.50, and includes new oil in the crankcase, lubrication of speedometer drive, transmission, differential, universal, wheel-bearings and grease-cups, and a wash.

Sale of the service of this establishment is done on a flat price basis, definite schedules being drawn up for the most usual

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maintenance and repair operations. In effect this transfers even to the casual patron all the advantages of the maintenance contract enjoyed by the operators of fleets. It is expected that as private owners become acquainted with Rognon service they also will wish to put their maintenance on a time contract basis.

Klingensmith Backs Cab Company

The Diamond Taxicab Company has been launched in New York City with Frank L. Klingensmith, Frank F. Beall and Harry T. Hanover, president of the Apex Motor Corporation, among its backers. The company will manufacture a standard cab which will sell for approximately $1,200. The new company states that its first fleet of cabs for New York City will number 1,000 and that the contract for the initial unit of 250 has been executed. It is expected that the first of them will be on the streets by July 1. Associated in the venture with Klingensmith, Beall and Hanover are O. D. Havenrich, Fred Lewis and United States Senator Owen of Oklahoma.

The taxicab will be of the town body type with rather less glass than the conventional cab. The panels will be removable so that they can be easily replaced in case of accident. The units will be made very accessible, interchangeable and easy of replacement. One of the novelties of construction is the removable upholstery. When the cushions and backs are removed, the whole inside of the cab can be washed out with a hose without doing damage to anything remaining.

The company will maintain model garages in various parts of the city with club rooms, swimming pool, billiard room, etc., for the chauffeurs. The carbureter equipment is so fixed that no adjustments can be made except at the garages.

Rowe Truck in Merger

The Rowe Motor Manufacturing Company, of Lancaster, Pennsylvania, maker of trucks, which was organized some years ago by Samuel J. Rowe, has been taken over by the Rowe-Stuart Company, of Washington. D. C. The merger will become effective at once, plans for enlarged producing facilities which will involve the erection of a new building at a cost of virtually $100,000, having been completed. Besides making motor trucks, the new company will also produce tires and other devices for motor cars. The company now controls these corporations: Rowe Motor Manufacturing Company, Anderson Tire Company, Washington, D. C.; Hydraulic Clutch Company, which will be moved from Baltimore to Lancaster, and Hydraulic Devices Company, also of Baltimore, soon to be in Lancaster.

Officers of the Rowe-Stuart Company are: Samuel J. Rowe, president; J. E. Farrell, Jr., vice-president; Robert L. Stuart, treasurer, and L. S. Allen, secretary.

An appropriation of $650,000 has been granted New York's street-cleaning commissioner for the purchase of 125 trucks to handle the ever-increasing problem of rubbish removal. These trucks will also be of use in snow removal.

Delivering Coal from Wagon Mine at 19 Cents a Ton

By J. LLOYD GRIMM

President, Grimm Coal Company, Pitcairn, Pennsylvania

WE are owners of a bituminous mine in Pitcairn, Pennsylvania. Since this has no railroad siding, all the coal must be hauled away by trucks. In April, 1920, we puchased a Selden for handling this work. This truck has been in operation continuously ever since, except for one month when there was no work for it.

The loads are taken on at the mine tipple, where the coal is discharged by gravity directly into the truck. The truck is equipped with a dump body and hydraulic hoist to facilitate dumping. We average 5 tons to a load, and are careful not to put more than this on, because we know that it doesn't pay to overload trucks severely.

The hauls are usually very short, so the truck averages between 75 and 125 tons a day, the average being 100 tons for a 10-hour day. Since we carry 5 tons to the load, this requires 20 trips. At the other end of the run, the load is dumped directly into railway cars located on a siding at either Pitcairn or Braddock. The truck averages 40 miles a day, so it has traveled 17,000 miles in the last 18 months.

During this time repairs and maintenance have been reasonable. In fact, we haven't spent over $200 on this truck, or only about 1 cent a mile. It has stood up so well that we figure it is good for at least 4 years, or a minimum life of 45,000 miles. We are figuring on a general overhauling at the end of the second year, and of course more repairs will be necessary as the truck gets older. To cover this item we are allowing $300 a year, which we feel will be ample.

Since we have some very bad roads to contend with, our tire expenses are high. In traveling the 17,000 miles we have used up two sets of tires. However, many new roads are being built in our territory, so our tire costs will probably decrease. Considering the heavy loads carried, and the hills it has to climb, the truck is economical in its use of gasolene, averaging 4½ miles to the gallon. The average daily consumption of oil is 3 pints.

This 3½-ton truck costs an average of $19.10 a day, 47.76 cents per mile, 19.10 cents per ton, and 19.10 cents per ton-mile.

Besides hauling to the railroads, the truck often makes trips to Pittsburgh where coal is delivered direct to large consumers. It is 17 miles by road to Pittsburgh, and the truck easily makes the round trip in half a day, so we figure on two trips a day. One a day like this the expenses are:

Variable expense (68 miles at 38.23 cents)	$19.20
Fixed expense (1 day)	1.81
Driver's wages (1 day)	6.00
Total expense for the day (2 trips)	$27.10

As the truck hauls a total of 19 tons in the 2 trips, the hauling cost is $2.70 per ton, and 15.88 cents per ton-mile.

We know that our present costs are very resonable for this kind of work, but it is evident that they will be reduced materially by the reductions being made in the cost of tires, gasolene, wages and other items of expense. In some of these more important items, such as tires, for example, there is already a reduction of 25 per cent. from the prices of last year.

According to our experience, it is better for a company engaged in coal mining to do its own trucking. We have tried hiring our hauling done, but by doing it ourselves, we save the cartage contractor's profit. It is also sometimes an advantage to have the driver directly responsible to us.

Our detailed costs follow:

OPERATING RECORDS.

Total Period.

Period covered, months	18
Days operated	425
Total round trips	8,500
Deliveries—pickups	8,500
Total loads, tons	42,500
Miles traveled	17,000
Gasolene, gallons used	3,778
Cylinder oil, gallons used	159⅜

Daily Averages.

Round trips	20
Deliveries	20
Total loads, tons	100
Miles traveled	40
Miles per round trip	2
Load per trip, tons	5
Ton-miles	100
Miles per gallon gasolene	4.5
Miles per gallon oil	107

COST RECORDS.

Investments.

Chassis, etc., complete	$5,700.00
Tire value	606.50
Total, less tires, to be depreciated.	$5,093.50

Fixed Charges—Yearly.

Interest on total investment (4 years) at 7%	$ 249.38
Taxes and licenses	75.00
Insurance	75.00
Garage expenses	114.00
Total per annum	$ 513.38
Total per month (per day $1.81)	42.78
Total for period, 19 months	770.07

Variable Charges—Period.

Fuel at 29⅓ cents a gallon	$1,114.51
Cylinder oil at 60 cents a gallon	95.62
Tires, 17,000 miles ($606.50÷8,500-miles life)	1,213.80
Depreciation, 17,000 miles ($5,093.50 ÷45,000-miles life)	1,924.40
Maintenance and repairs, estimated	450.00
Total variable charges (per day $11.29)	$4,798.33
Driver's wages (per day $6.00)	2,550.00
Total fixed charges	770.07
Total operating costs	$8,118.40

Unit Costs.

Cost per day operated	$ 19.10
Cost per mile traveled	.48
Cost per ton hauled	.19
Cost per ton-mile	.19
Repair cost per mile, estimated	.026
Repair cost per mile, actual	.012

Washington, D. C., has a new 'bus line in the Washington Transit Company, which has been granted a charter to operate 'buses on an 8-cent fare on seven routes. More than 125 'buses are now in operation on 17 lines, in spite of the opposition offered by the two street-car companies, which have complained of a reduction of revenue through the running of the motor carriers.

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The Effect of Vehicle Speeds on Modern Highways

By W. G. ROBERTSON

IT is well known that speed is a very important factor in the amount of destruction which results from the unrestricted use of the roads by vehicles. The impact increases very rapidly with increase of speed. It increases much more rapidly in the case of a truck equipped with solid tires that none equipped with pneumatic tires, because of the greater resilient qualities of pneumatic tires.

A report issued by the United States Bureau of Public Roads on the "Effect of Impact on Pavements" gives some interesting information on this subject, and shows that the impact resistance increases with the velocity, with the total weight of the vehicle, and with increasing road-surface roughness. In these tests the impact resistance of good asphalt or bitulithic or other smooth pavement was practically negligible, and reached its highest value on granite-block roads with sand-filled joints, and on badly worn macadam pavements. The rate of increase of impact resistance with speed was most marked on the roughest roads.

The following urban pavements are enumerated in the order of their desirability for vehicle operation from the point of view of tractive resistance at 12.4 miles per hour, as found in this investigation. (1) asphalt, (2) wood block, (3) hard, smooth macadam, (4) brick block, (5) granite block with cement-filled joints, (6) cinder, (7) gravel, (8) granite block with sand-filled joints.

The equivalent grade at 12.4 miles per hour of a badly worn city macadam road was found to be nearly three times as great as that of the best asphalt road tested. This means, at this speed, a consumption of energy at wheel treads of nearly three times as much on level macadam roads as on good level asphalt roads.

Increasing the gross weight of the vehicle by 12 per cent. through load was found to have no effect on tractive resistance within the observed speed limits for smooth roads in good condition; but on rough roads, a distinct increase in tractive resistance with this extra weight was observed.

Tests have been made which show that increased speed of a vehicle equipped with hard rubber tires tremendously increases the impact which its wheels make on the roadway where there is any unevenness. On the other hand, where pneumatic tires are used, increased speed adds comparatively little to the impact. It has been suggested that these tests will be of great value not only in settling questions of design, but may also lead to a rational basis for determining license fees for motor vehicles.

Trucks have been used in these tests varying in size from a 1-ton up to a 7½-ton truck carrying an excess load. Each truck was run over a special recording device imbedded in the roadway and the impact which resulted, when one of the wheels made a 2-inch drop from a ledge built in the surface, was recorded.

Recent tests were made with a 3-ton truck loaded so that the weight on each rear wheel was 7,000 pounds, the unsprung portion being 1,700 and the sprung portion 5,300 pounds. The truck was equipped first with an old solid tire that was worn down to a thickness of 1 inch. Then, with exactly the same load on the truck, a wheel was fitted with a new solid tire 2½ inches in thickness. And finally the truck was equipped with pneumatic tires, 42x9 inches, blown up to a pressure of 142 pounds per square inch. The following table shows very clearly the bad effect an old tire is likely to have on a road surface and the greatly lessened impact which is produced by trucks equipped with pneumatic tires. The tests show that as the vehicle's speed was increased, the impact from the old hard rubber tire increased greatly. The impact from the new tire was somewhat less.

Speed.	Old Tire. Pounds.	New Tire. Pounds.	Pneumatic Tire. Pounds.
5.7 miles.....	11,600	9,400	7,100
10.2 miles.....	18,500	14,100	7,900
14.6 miles.....	26,500	18,700	8,330

In fixing speed limits for motor vehicles legislators hitherto have given consideration mainly to the question of safety. Diversity of opinion as to what constitutes a safe maximum speed is reflected in the variety of legislation on this subject in different provinces and states. The State of Kansas sets 40 miles per hour as the upper limit of speed in the open country. California and a number of other states draw the line at 35 miles per hour, while 30 miles per hour is about the average for all the states. Thirty miles per hour is the maximum speed limit in British Columbia, while the other western provinces fix no limit other than requiring speed at all times to be reasonable, having regard to traffic. In Ontario, Quebec and Nova Scotia the upper limit has been fixed at 25 miles per hour. New Brunswick sets no definite speed limit other than what is reasonable, having regard to traffic, while Prince Edward Island puts the ban on a speed in excess of 15 miles per hour.

In Ontario the Load of Vehicles Act (Section 5) stipulates that no vehicle carrying a weight in excess of four tons, including the vehicle, shall be operated on any highway at a speed greater than 10 miles an hour; and no vehicle carrying a weight in excess of 6 tons, including the vehicle, shall be operated upon any highway at a speed greater than 8 miles an hour. The speed limits for trucks provided in the Ontario act are extremely restrictive. If modified in conformity with recent experience, all commercial motor vehicles equipped all around with pneumatic tires would be restricted to 25 miles per hour on open country highways, while vehicles equipped partially or all around with solid tires would be required to conform to the following speed schedules:

Gross Weight.	Speed on Open Country Highways.
Under 2 tons.....	25 miles
2 to 6 tons.....	20 miles
6 to 10 tons.....	15 miles
10 to 14 tons.....	12 miles

To fix the speed limit of commercial motor vehicles at an extremely low figure also means interference with the free movement of general traffic on the highways. On a road of average width, when there is a steady stream of traffic in opposite directions, it is at once both difficult and dangerous to pass a succession of slow-moving vehicles in the face of oncoming traffic.

The great increase in motor truck traffic, indeed, points to an early necessity of providing such width on main highways as will enable trucks and slow-moving vehicles to travel the outside of the road and leave a lane of sufficient width for two lines of the more swiftly moving passenger-cars. Under present conditions it is just a question whether it might not be conducive to safety to require all motor vehicles to travel at not less than a minimum rate of, say, 12 miles per hour under normal traffic conditions.

Width of highway degrees, of grades and curves, nature of road intersections, ditches and railway crossings, and volume and kind of traffic are all factors which must be considered in determining speed from the standpoint of safety. So complex are these factors that it is impossible to state what might be considered a reasonable speed on any but a straightaway stretch of country road without taking into account local conditions. Vigilance and sound judgment are essential to safe driving everywhere, and no arbitrary speed limits can be devised which will relieve the drivers of motor vehicles from the ever-present obligation of giving due regard to constantly changing traffic and road conditions.

Selling Cocoa by Motor

As a means of increasing interest in and diffusing a first hand knowledge of the virtues of Fry's "Pure Breakfast Cocoa," the proprietors of it have enlisted the services of two motor vehicles for touring England. One is taking a southern tour from Bristol, skirting the South and East Coasts, while the other is traveling due north from Bristol through the industrial areas.

These vehicles are fitted as model kitchens. Both are painted orange color, and each is in charge of two women demonstrators in a special distinctive uniform.

The front is fitted as an all-enclosed coupe, with comfortable driving quarters. The rear portion is the "model kitchen," of which the two sides and back can be thrown open. Inside the walls are lined in white zinc tiling, all woodwork is enameled white, the floor is covered with black and white squared linoleum, and the effect is extraordinarily bright and pleasing.

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Who Shall Pay for Good Roads?

By ROBERT M. HAIG
Professor, School of Business, Columbia University

THE demand for more and better highways arising from the great increase in motor traffic during the past few years has resulted in a financial problem so great as to make imperative a critical re-examination of the accepted theories of highway finance. Few realize that our states and localities are now spending most of their money for two purposes—roads and schools. There seems to be almost no limit to the need for additional funds for these two purposes alone. Our theory of finance with respect to roads must be developed and refined, if the necessary road support is to be secured and if serious consequences to the motor vehicle industry, to the taxpayers and to the community as a whole, are to be avoided.

Many leaders are beginning to appreciate the truth of these statements and the importance of the situation. During the past few months an attempt has been made to secure from students of the problem a sharper definition of the questions which must be answered. Various highway engineers, tax experts and others have been consulting as to the possibility of securing a correct analysis of the problem and a sane program of finance. It is the purpose of this article to set forth some of the questions which have been raised and some of the tentative conclusions which have been reached in the hope that discussion may be stimulated and progress made toward a revised and more scientific theory of highway finance.

There appear to be two fundamental questions. The first relates to the division of the cost of supplying highway facilities as between present taxpayers and future generations. To what extent shall the roads be paid for by taxes and to what extent by bonds? The second relates to the division of the cost as between users of the road and taxpayers in general. To what extent shall the roads be paid for by motor car fees or gasolene taxes and to what extent by the general tax levy?

If it is possible to arrive at the correct answers to these two questions the problem is solved. But the correct answers involve a combination of engineering knowledge and sound economic analysis.

Certainly the present taxpayers want good roads. They want and they deserve as many good roads as are economically justifiable. But how much of the cost of a good road may fairly be charged to the present generation and how much to the future? If the present generation pays the entire cost of all the roads built it is obvious that fewer roads can be built than if a portion of the cost were met by the proceeds of bonds. But just how much of the cost may be bonded in a sound and defensible financial program for roads?

The general answer is simple enough. Any debt which the present generation passes on to the next must be adequately covered by sound assets passed on to that generation. That is the theoretically correct answer. In general each generation should pay its way. This is axiomatic. However, when one examines the current applications of this axiom, he finds much bungling because of inadequate analysis of the facts. Consider what the chief of the United States Bureau of Public Roads, Thomas H. MacDonald, says regarding one such case of bungled application:

"We have had it imposed upon us almost as a commandment that *'Thou shalt not build a road which will not last longer than the life of the bond.'* Granted. But is the life of the road merely the life of the surface? Because a highway surface goes to pieces are we to conclude that the entire investment in the highway has been lost? To take a specific case:

"The State of New York has issued road bonds for about $100,000,000 and I have seen within very recent times articles written in which it is said that the roads are going to pieces so badly that they will be gone before the bonds have been paid. Probably the road surfaces built with the proceeds of those particular bonds will be gone before the bonds are paid. But it is a fact that this year in New York State we (the Bureau of Public Roads), in coöperation with the state, are widening those old macadam roads with 18 feet of concrete, leaving a strip of the old macadam in the middle. This work has only just begun but successfully so, and the result is a 24-foot surfaced roadway in place of the old 12- or 14-foot macadam surface on the same roadbed that was built with the bond money and at a cost which is enough less than the average cost of the new construction of concrete 18 feet wide to absorb the first cost that the state has invested. In other words, so far as I can see it, New York State by the investment of $100,000,000, and by building cheap roads when her needs were for cheap roads, has been having the service of those roads all these years at not to exceed the interest cost and has all the investment left.

"So it is apparent that we must learn to differentiate between the permanent and transient features of the road. In fact, while we expect the surfacing to wear with use, we have perhaps overlooked an actual increment in value in the permanent investment as the years go by. In other words, the subgrade is better as it becomes compact, the bridges are improved, the hills are cut, the safety factors are strengthened and railroad grades eliminated. Use of the road may deteriorate the surface; it only enhances these other factors. It is because of this attention to the subgrade that the old roads of Rome and France are still in use to-day."

Mr. MacDonald's conclusion that "we must learn to differentiate between the permanent and transient features of the road," based, as it is, upon the extensive surveys of the Bureau of Public Roads in New York, California and elsewhere, gives a dependable engineering answer to the economist's query regarding the soundness of the asset which may properly be passed on to the next generation. It holds forth a hope of determining in a fairly definite and precise way what each generation must pay if it is to "pay its own way."

It is suggested that a good method of meeting the problem of differentiating "between the permanent and transient features of the road" would be to establish a new and broader definition of maintenance. If maintenance, to be cared for by the present generation, were so defined as to include not merely day-to-day and year-to-year expense of keeping the highway in serviceable condition but also the replacement of the surfacing when neded, the road would never wear out, but would be turned over to the next generation with its value unimpaired. A road once built to a given standard would be "maintained" for all time to that standard, each generation assuming responsibility for preserving the soundness of the asset during the period it used it. It would appear reasonable to classify as "permanent features" such items as grade reduction, new drainage structures, new alignment and the excess cost of replacing an inferior surface with a superior type. However, if a hard surface be replaced by a new hard surface of the same class the entire cost of replacement would be charged to maintenance or current expense as a transient feature.

SUCH a definition of maintenance, of course, destroys the foundation of the standard argument against long-term bonds for highway construction. The life of the road is indefinitely long. The argument thus far, however, ignores the possibility that, in the far-distant future, roads may not be so useful to society as they appear to be to the present generation. Consequently caution dictates the amortization of the entire road cost over a reasonably long period, perhaps 50 years.

It appears, then, that by adoption of a definition of maintenance such as that suggested above, the entire original cost of a road might conceivably be bonded on a basis of perhaps 50 years. The theoretical minimum which might fairly be charged against the present generation would then be the sum of (1) an adequate maintenance allowance, (2) interest on the bonds, and (3) an amortization item sufficient to retire the bonds in 50 years. The theoretical maximum which could properly be

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—a *new* truck built by a *new* organization—an organization directed by a *new* staff of executives who were inspired by ideals that also are *new* in the field of delivery units.

—a *new* truck built to meet old conditions in a *new* way.

—a truck that is rated in a way that is *new*—½-¾ ton capacity.

—a truck designed to give something *new* in performance, economy, maintenance and long life.

—a truck that places a *new* interpretation on what a truck user's dollar should buy.

Dealers: The *new* VIM is NEW remember. There is a surprise in store and you had better find out from us more about it.

VIM MOTOR TRUCK COMPANY, Philadelphia, U.S.A.

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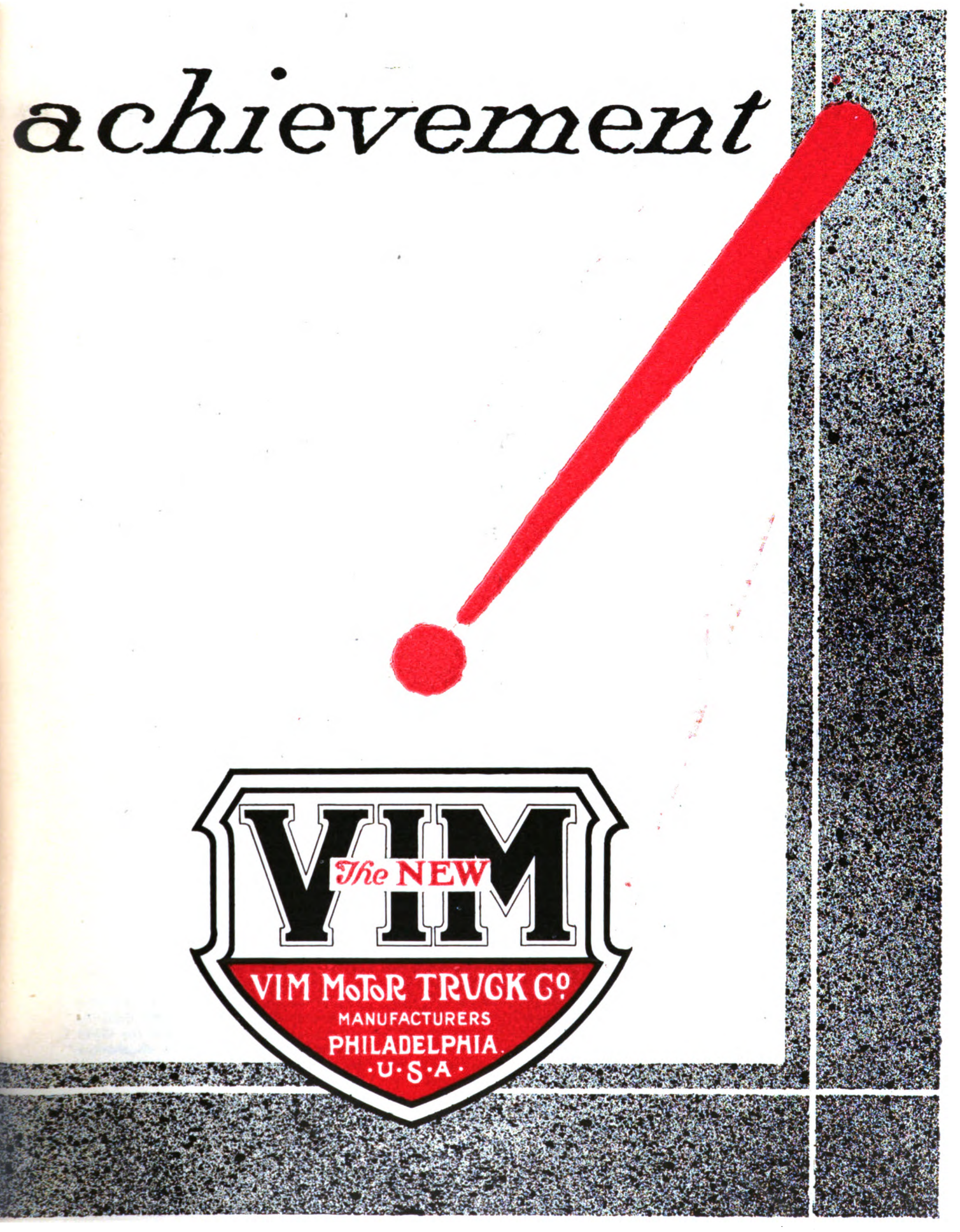

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passed on to the next generation would be the bonded indebtedness, reduced by the amount of the accumulated amortization items, against which would exist the roads themselves in a condition as good as when originally constructed.

It must be borne in mind that the above analysis deals with a theoretical maximum and minimum. If space permitted it would be pertinent to discuss the advantages of departing from those limits in rich communities as compared with poor communities and in communities with a bright outlook compared with communities whose "futures lie in their past."

Irrespective of whether the above analysis or some other is finally accepted as the proper one for determining the portion of road costs which shall be absorbed by the present generation, the question remains as to how the cost to be currently absorbed shall be distributed as between the user of the road and the general taxpayer. The analysis given above is very suggestive, however in the search for a solution of the second question.

Motor vehicles as a test of general taxpaying ability have obvious disadvantages, and although many states continue to tax them as personal property the trend is definitely away from this practice. Motor vehicle taxes are coming more and more to be pure efforts to measure the use of the roads.

It is also true that while motor vehicles are not the sole users of the road they are usually the only users to be subjected to a special tax. There is some justification for the practice of confining the taxes to the motor vehicles in the fact that the additional road costs which are the occasion of the present difficulties are demanded by the users of motor vehicles alone.

The recent report of the New York State Special Joint Committee on Taxation and Retrenchment contains the following clear analysis of the theoretical problem involved in determining these additional costs.

"The question arises as to whether the whole cost or only a part, and, if only a part, precisely what part, of the costs should be borne by the user. Some of the enthusiasts for heavy motor fees seem to forget that roads and streets were considered necessary before the advent of the automobile and the truck and that the public's interest in these roads and streets was often considered sufficient to justify their construction and maintenance as a general public charge. In the case of city streets, of course, it has been a general practicee to charge a portion of these costs to the land immediately served, in the form of special assessments. . . . On the other hand, some of the representatives of the motor vehicle interests go to the other extreme, asserting that the public builds roads for itself, free for all to use as they choose, and that it is unfair to charge any part of the costs to any particular group of users.

"It seems to the committee that the true view is one which lies between these extremes. That there is a general public interest in the streets and highways is true, but it is equally true, that when these streets and highways cost more than they otherwise would because of the necessity of supplying accommodations to a particular group of users, such additional cost may be properly chargeable to those particular groups. The problem is to draw the line.

"In cases where the roads are used for business the term 'user of the road' must be understood to be the person for whom the service is rendered. . . . A charge on the user of the road would under the present system be imposed, of course, upon the truck, but it will appear as a business expense of the truck owner, who must pass it on in higher prices to the consumer. . . If the true costs of truck-borne eggs (for example) including the cost of supplying any additional road facilities involved in the use of the truck, is not charged to the buyer of that egg, the egg carried by the railroad is discriminated against, for it must certainly be sold at a price which covers the entire cost of its transportation. . . .

"The conclusion is that only by charging to the user of the road the community costs involved in supplying him the additional road facilities required by him in his use of the roads can the motor truck competition with the railroad be placed on a basis which will insure an economically sound decision in the struggle between the motor truck and the railroad. This is the only way to keep the account straight, so that an industry whose proper development means so much to the solution of the transportation problem may be neither repressed or unconsciously subsidized."

Charges on the user of the road rest on the benefit principle of taxation. They attempt to apportion the costs as accurately as possible and to ask the person who desires the direct benefit to meet the cost which his use of the road entails. The advantage from the point of view of persuading taxpayers to support a program of road improvement in times of financial pressure like these lies entirely with the plan of imposing charges on the benefit principle rather than on the principle of 'ability to pay' which is depended upon to justify general taxation. Under the benefit principle the man pays directly for what he gets and can readily compare the cost he pays out and the benefit received.

The recent traffic counts indicate that the main roads in many sections are being almost monopolized by motor vehicles. This raises the question as to whether the entire cost of maintenance as above defined might not be fairly charged to the user. The portion of the interest and amortization charges which the user should assume constitute the nub of the tax problem in this field. Much can be said in defense of the assumption that the roadbed would be necessary irrespective of motor traffic and that the maximum part of the capital charges which may be fairly imposed upon the user would be the portion which the cost of the special surface bears to the entire cost of the road. This figure could be readily determined.

W. H. Rodgers, former auditor of the Bethlehem Motors Corporation, has been elected secretary and assistant treasurer of the Bethlehem Motors Corporation of New York, the new company manufacturing the Bethlehem truck.

New Mack 'Bus Body

Mack "shock-insulated" 25-passenger 'bus chassis are now being equipped with a new type of body, designed and built in the Mack factory, as a result of experience with many different types of street-car and body-builders' products and about two years' experiments in original construction. The new body has been designed to provide the utmost stiffness and strength, the maximum resistance to vibration and weaving stresses and, at the same time, a considerable reduction in the weight which is usually found in bodies of its size. These results have not been achieved by any single or revolutionary departure in coach-building methods, but by a combination of refinements, each of which has contributed to improvement in strength and durability on the one hand and reduction in weight on the other.

Due regard has been given to the matter of appearance, roominess and passenger comfort, matters not easily compatible with rugged structure and low weight. In its design the object has been to make a body which will most nearly meet average requirements. Cheapness has not been attempted, but extravagant limousine effects have been avoided. The body is of conservative construction and appearance and has been built expressly for one chassis, the Mack AB "shock-insulated" bus. This has naturally simplified the problem, somewhat, since it was not necessary to consider the different frame widths, wheelbases, floor obstructions and floor heights which occur in different makes of chassis.

The body is of the conventional front-entrance type, with inclosed steps and collapsible leaf door, having five windows and the door on one side and six windows on the other. The front corners of the body are bevelled in a bay-window effect and the rear corners are rounded on a large radius. There are four horizontal panels, carried right around the back from one side to the other. Below the windows is a broad perpendicular belt, separated from the lower panel by a heavy wood guard-rail to prevent denting of the body by side-swipes. The lower panel has a deep inward curve at its lower portion. Above the windows are small transoms, increasing natural interior illumination and affording standing passengers direct vision. Above the transoms is a broad band beneath the eaves, which carries the louvre type ventilators. The roof is of the crowned canopy type appearing perfectly flat from the outside. The back wall is provided with three windows of the same type as the side ones with transoms. The middle window is carried in a concealed emergency door fitting perfectly flush on the outside. No break occurs in the lower panel at the rear wheels the wheel-house being concealed as permitted by its small height due to the use of 34-inch wheels on this chassis.

Within there are six standard 2-passenger crossseats extending back from the front of the bus to the wheel-houses. Over the wheel-houses are lengthwise seats accommodating 4 passengers each and across the back a wide cross-seat for 5. The seat has three cushions the middle of which is

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removable to afford access to the emergency door. The driver's seat is of the bucket type mounted on top of the tool box.

The floor is of tongue-and-groove hardwood 1¼ inch thick laid directly across the frame and covered with cork linoleum, cemented on and bound with steel. White oak and ash framing is used, all body stanchions and roof bows being steam-bent to shape instead of sawed, as is usual. This insures strength and rigidity through proper direction of the grain at all points, whereas sawed members are likely to be cross-grained at points subjected to strain. Steel gussets are used to brace the stanchions to the frame and deep pressed-steel under braces are used to support the outer edges of the body. Heavy-gage sheet aluminum is used for the sheathing, to secure lighter weight, rust-proofness, greater freedom from cracking at edges and around holes and freedom from noise, as compared with steel. Door and window frames are of solid mahogany.

Windows are fitted with four Edwards anti-rattlers each, are of the lift-up type and glazed with Grade AA glass. The front door has clear glass upper panes and polished plate wire glass lower panes. The edge is provided with a soft rubber pad. It is operated by means of a crank to the left of the driver through overheated rods, visible and accessible, yet out of the way at all times. This door is hung at the front jamb of the door, thus being semi-automatic. The emergency door at the rear is fitted with a three-way latch, the handle being inclosed in a shallow box covered with thin glass which must be broken to open the door.

Crystal plate glass of heavy thickness is used for the windshield, the frame being of metal, all panes swinging for ventilation, the upper portion being double. Over the windshield is a green visor. The front of the body is joined to the dash cowl by a leather diaphram, thus providing flexibility at this point and preventing rattling. The body is fitted with complete wiring for lights and buzzer system, a step light working automatically by the opening and closing of the door. A roller sash curtain back of the driver is provided for night driving and a large mirror is mounted above the windshield to afford rear vision. Heating is by exhaust, the usual cast steam pipe with 90-degree elbows being replaced by tubes of thin shelby seamless tubing, no bends have greater than 45-degree angularity. The outside piping leading from the heater valve to the inside of the body is lagged with asbestos air-cell insulation to conserve heat and the interior pipes are covered with perforated metal grating. The heater valve is operated by a rod on the dash.

Seats are of the standard spring cushion and back type, with rattan covering. Of course special upholstery in leather, leatherette, whipcord or velour, with special springs, etc., is available where required, though rattan seating is generally preferred for city service. There are four vertical tubular posts to serve as additional stiffeners and rod supports and as handholds for the passengers. In addition, each cross-seat back has a handle, sanitary type straps are fitted in the rotunda at the rear, and there are grab handles on both sides, inside and outside the door. There are advertising racks above the windows.

The complete body weighs 2,700 pounds.

White Service in Chicago

After twelve years in its present location, the Chicago service station and branch office of the White Company will move from the premises in South Wabash and Michigan avenues to a new building now being erected at Archer avenue, Wallace street and 24th place. Work on the new service station is being rushed to enable the company to occupy it about the middle of September.

The removal to a section somewhat distant from automobile row was planned strictly as an efficiency move on the part of the company not particularly to get away from the boulevard but to have a location that is well suited for present-day and future servicing of hundreds of Chicago delivery systems. Novel surveys were made to determine the ideal location. Every customer and every known prospect was spotted on a map and it was found that if all trucks were to start for the service station simultaneously, they would travel the least distance and consume the least time going to a point very close to the Archer avenue location.

Service Manager J. T. Swigert said that plans had been made to develop the maintenance work in step with the growing distribution of the company's product. This will be done not through space expansion alone but through compact operations involving new time-saving methods and improved mechanical layouts. The company expects to do service work in much less time than is normally required.

The new station is of concrete, brick and steel construction, having 55,000 square feet. It is designed as a one-floor plant and nearly all the space is to be devoted to service work, although a small section of the building on the northern corner of the lot will have two stories, housing the sales, executive and clerical offices.

The lighting arrangements are one of the features of the plant. A large part of the wall area on the four sides of the building is occupied with windows of the studio type, while the roof areas are almost entirely of glass, letting daylight into every inch of the ship space, parts department, storage and display rooms. Even the basement, housing the boiler-room, cold-storage, lockers and toilets, will have ample daylight. A traveling crane will serve a large part of the shop space, expediting the movement of engines, axles and other heavy units.

One of the advantages of is the total absence of abutting buildings or land. The lot is bounded by three city streets and an alley, with an entrance and exit for trucks on Wallace street, a few steps from Archer, and two additional entrances on 24th place. All these vehicle doorways and all interior dimensions give sufficient clearance to accommodate the largest trucks in service. Other entrances on Archer avenue give access to the part department, general offices and display rooms.

In addition to the benefit of being more centrally located, a big advantage is expected from the location on a main trucking thoroughfare. Archer avenue is directly connected with the loop at the present time and will soon offer an even better artery for truck traffic when the Canal street improvements are completed. In fact, the strategic importance of Archer avenue from a service and traffic standpoint was clearly established in the surveys that were made.

Coincident with the announcement of the new building, the company reports a volume of business greater than at any time in the past two years. The annual list of White fleet owners using ten or more trucks shows a steady increase in the number of Chicago firms. Aside from its mercantile growth, the product of the company is making rapid strides in public service. In postal work alone in Chicago there are 258 of these trucks while the number that is engaged in the fire, police, salvage and public health departments, would total another hundred. Thirty-two Chicago fleet owners operate 1,709 White trucks, which gives some idea of the importance of service as expressed in the company's new home.

Parts Sales to Date

The following table shows the sales by members of the Motor & Accessory Manufacturers' Association, the total of past due accounts and the total of notes held, for all the months of 1921 and first four months of 1922.

Month, 1921	Total sales	Per cent change	Total past due	Per cent change	Total notes outstanding	Per cent change
January	$ 6,264,587	.....	$8,099,727	.....	$4,359,871	.....
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,063,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,353,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1,31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922.						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.5 Dec.

The state of Maryland has begun collection of the 1-cent-a-gallon gasolene tax, the proceeds of which will be used to reduce the deficit of $1,000,000 which has stood for a long time against the maintenance fund of the State Roads Commission. On January 1, 1924, the present tax will be superseded by a new one of 2 cents a gallon, the funds to be applied toward a reduction of the license fees for motor vehicles.

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City of Paris Owns 2,500 Motor Vehicles

There Are 1,000 Motor 'Buses, an Equal Number of Street-Cleaning Machines, and 500 Fire and Police Cars

PARIS possesses a fleet of about 2,500 motor vehicles, either directly owned and operated by the municipal council or coming under its control. The purely municipal vehicles, such as street-sweepers, sprinklers, refuse-collecting trucks, etc., number nearly 1,000. There are also rather more than 1,000 'buses, which, while being "farmed out" to a separately constituted company, are in reality municipal property. In addition to the above, the whole of the Paris Fire Brigade is motorized, but these vehicles are under the control of the Prefect of Police as distinct from the Prefect of the Seine. The police service too, has its own fleet of trucks and cars for the rapid removal of the members of the force and general transport. If the administrative peculiarities which differentiate Paris not only from English cities but from other French centers are ignored, the total of about 2,500 "municipal" vehicles can be accounted for as follows: Street-sweepers and waterers, house refuse collectors, etc., 1,000; motor 'buses, 1,000, fire engines and police vans 500.

Although at the head of this big fleet, the municipal authorities actually operate only a portion of these vehicles. In 1917, when the German armies were threatening Paris and coal and foodstuffs were scarce, the municipal council realized that it could no longer rely on private initiative to keep the city supplied with the necessaries of life. Supplies really existed, but they could not be got to the consumer owing to the lack of transportation. The municipal council therefore decided to become general carriers and placed an order for 120 Fiat 4-ton trucks and 120 Pierce-Arrow 5-tonners. The action was much criticized at the time, particularly by the trade, the members of which claimed that French vehicles ought to have been bought. It is difficult to understand how this could have been done, however, in view of the fact that the French army monopolized the output of the French motor factories. This municipal fleet was first used for carrying coal to the city and in distributing it to the retailers. It also rendered excellent service in bringing in food supplies, and in keeping the Vilgrain sheds stocked with necessaries for direct sale to the public.

Although normal conditions have now been established, this municipal fleet which has grown to about 300 vehicles, remains in service. They are made use of for keeping the municipal retail stores supplied with goods, for hauling sand, wood paving-blocks, and other road-building material, and also as emergency vehicles for collecting household refuse. This organization, known as the T. A. M. (Municipal Auxiliary Transport Service) is the only one of which all the members are municipal servants.

The head of the garage receives his orders from the chief engineer of the municipal street-cleaning department, and this official also has control over all other municipal vehicles owned by contracting companies. About 40 of the 300 vehicles owned by the T. A. M. are passenger-cars of the most diversified types used by municipal officials. They are all kept and maintained in a big municipal garage erected during the war over vacant land and paved streets in the southwest corner of the city. It is claimed to be more economical to do all the maintenance and repair work in the municipal garage, than give it out to private firms. The work is facilitated by the fact that only two leading makes of trucks are used and that large numbers of parts for these have been secured from army stocks.

The biggest fleet of vehicles for the collection of household refuse is that belonging to the S. I. T. A. This concern, which operates under the direct control of the municipal council, is charged with the collection of household refuse and its delivery to the various incinerating stations in and around the city. Paris decided not very long ago that all household refuse should be collected in one round, and that the work, which begins at 6:30 A. M. should be finished at 8 or 8:30 in the morning. In order to do this the fleet has to be increased from 300 vehicles to 640, and the cost to the city rose from 16,000,000 to 23,500,000 francs per annum.

The volume of house refuse to be collected naturally varies with the season, being highest in winter and lowest in August. The total is more than 31,000,000 cubic feet a year, and the daily average during the month of April of this year was 2,520 tons. When the contract was passed with the S. I. T. A. and other companies responsible for household refuse collection, it was understood that the T. A. M., or mmunicipally-owned, trucks should be available in times of necessity. In order to assure this, a certain number of Fiats and Pierce-Arrows have to be kept in reserve for collecting household refuse, and only run 10 miles per day. This, of course, is a costly use for 4- and 5-ton trucks and is one that no ordinary contractor would accept. On certain days these municipal trucks are made use of for cleaning up the central and various local open-air markets, which open early in the morning and close about midday. Even this, however, is insufficient to keep them employed to anything like their full capacity. Paris has experimented with other systems and found them unsatisfactory.

Refuse collection used to go on all night, but this was objected to both by those who did not go home until the wee hours of the morning and by the sober-minded who claimed the right to a good night's sleep. An early morning collection, by which each vehicle made two, or sometimes three, rounds, could not be finished until nearly midday, and left no time for the street-sweepers to do their work. With a bigger number of vehicles all the refuse could be cleared away by 8 o'clock, and the work of sweeping and washing the streets finished before the real life of the city began.

A few years ago Paris had great faith in the electric for collecting household refuse. These vehicles were to bring their material to the incinerating stations; the heat generated by the burning of the refuse would drive the steam-engines, which in turn would drive the electric generators, which in turn would charge the storage-batteries free of cost. Other advantages were economical slow running, ease of starting, silent operation, etc. The results were not all that were expected, for the electrics were slow, they were incapable, under certain weather conditions, of climbing some of the hills in the Montmartre district, and they were not as silent as expected. At the present time the last of the electrics are being converted to gasolene.

The S. I. T. A. fleet of 505 vehicles consists for the major part of Schneider chassis similar in all essentials to those used by the Paris Omnibus Company. About 75 of this fleet comprise 3-ton Renaults with the engine under the driver's feet and the radiator on the left-hand side. This vehicle has bevel-gear drive with final reduction by planetary gears in the rear wheel hubs. The all-metal body is of the rear dumping type operated by the engine from the driver's seat, and is divided into sections, with covers on rails, so that as each section is filled it can be covered up to prevent the contents being blown about.

Another controlled company is the S. A. S. M., which makes use of De Dion Bouton and Latil machines. The latter are the front-wheel-drive type, and carry a hydraulically-operated rear dumping body of 250 cubic feet capacity. The engine is a 4-cylinder of 105x140 mm. bore and stroke. Another concern, the C. G. E. A., has taken over 100 of the old electrics and has converted them to gasolene. This work has been done by the Latil Company, with its front-wheel-drive system. Although there are five separate types of vehicles for household refuse, manufactured by Schneider, Renault, De Dion Bouton, Latil, and the old electrics converted by Latil, the general type of body is the same for all. The drivers for these vehicles are provided by the respective companies, but the city street-sweepers are used for handing up the dust-bins and replacing them when empty.

Most of the street-sweeping and washing in Paris is in the hands of the S. A. S. M., a concern which is very closely connected with the De Dion Bouton Company, and uses vehicles of this make. As Paris conditions vary from such broad avenues as the Champs-Elysées to streets only wide enough for two vehicles abreast, a single type of sweeper and waterer would not be suitable. A combination sweeper and waterer is generally preferred, and in most cases carries a 770-gallon tank capable of watering a width of 40 to 49 feet at one operation. For washing only these vehicles operate on a width of 8 to 9 feet. While the De Dion Bouton has its sprayers in front, just ahead of the steering wheels, the Latils are distinctive by having their sprayers behind the front wheels and just ahead of the brush. The latter is driven by gears instead of by chain.

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Laffly sweepers find their most extensive use in the small sizes for streets of normal or narrow width. These, also, are of two general kinds—sweepers only and combined sweepers and waterers. As labor has become very costly in Paris, the authorities are endeavoring to produce a machine which will gather up the dirt as it sweeps.

Other interesting developments in the experimental department, says the writer in *Motor Transport* to whom these facts are due, are a small motor vehicle for washing footpaths and a pneumatic-tired trailer for automatically registering vibrations. Many of the streets of Paris are kept in repair under contract, and under this arrangement it becomes necessary to decide when the wood or granite blocks shall be relaid. When this is decided by eye there are apt to be differences of opinion between the road engineer and the contractor. It is believed that a trailer fitted with a vibration recording apparatus, and taken over the streets at a given speed, will give a scientific record, and will provide a standard by which the state of the surface can be accurately judged.

Rome's New Mail Motors

During the past two or three years the Postal Department at Rome has developed a collection and delivery service entirely by motor trucks which is highly appreciated by the public. The capital covers a considerable area and being built on seven hills it was practically impossible, by the use of horses only, to assure rapid collection and delivery of letters between the district offices and the central office and railroad station. Very frequently the local letter-boxes were only cleared once in 24 hours and, if it was desired to get a letter away without delay, it was often necessary to take it in person either to the station or to the central office.

The Postal Department has adopted a fleet of Fiat vans of various types. Quite an important feature is the direct collection from local pillar-boxes by means of light mail vans with a 10 horsepower engine. The daily mileage of these light vans is about 45, with a fuel consumption of 2¼ gallons on an average. This consumption is naturally higher than for a normal service, owing to the frequent stops at the various letter-boxes and the crowded and narrow streets. The object of these small vans being to assure rapid service between the local letter-boxes and the main office or station, the average daily load does not exceed a quarter of a ton.

For the parcel-post and for service between the local and central office use is made of 1-ton Fiat vans on pneumatic tires. These average 30 miles a day and use 2½ gallons of fuel. The capacity of these vans has to be sufficient to provide for exceptional activity, but the average daily load does not exceed three-quarters of a ton.

The biggest vans in use in Rome are 1½-ton Fiats fitted with dual pneumatic tires on the rear wheels. These are used only for regular service between the railroad station and main or sub-offices, and consequently are nearly always operated with a full load.

Heavy Traffic Tendencies in British Cities

By J. A. BRODIE
City Engineer, Liverpool, England

WHEN, in 1898, some Liverpool pioneers arranged for the experimental trials of heavy motor wagons, which did so much to encourage manufacturers to continue their experimental work, and to establish English types of steam and gasolene motor vehicles, it was little thought that the motor wagons would by this time play such an important part in the internal traffic of our cities, and still more in carrying traffic so quickly to and from the manufacturing towns up to about a 40-mile radius from the Liverpool docks.

The latest figures taken on the Road Board basis show that over 6,000,000 tons per annum are passing in and out over the city boundary on the roads leading to the manufacturing districts and of this approximately 3,000,000 tons are using the Prescot road route, of which 95.3 per cent. is motor tonnage, while approximately 1,500,000 tons, of which 96.3 per cent. is motor tonnage, is regularly using the northern section of Queen's Drive, which was originally designed for light traffic.

If the class of traffic from the Lancashire and Yorkshire manufacturing towns, and the special trading regular services carrying manufactured articles by road through to London in the south and to Scotland in the north, continues to grow at its present rate (and it is now about five times greater in tonnage than in the early part of 1914), it will clearly involve the construction of special wide roads leading through the town to the docks, with paving suitable to withstand the severe wear caused by the heavy loads carried.

Heavy traffic, which was formerly horse-hauled, is now more mixed in character, and the horse has to compete with the steam and gasolene wagons, both capable of carrying heavy loads. The percentages of tonnage along the line of docks, which in 1909 were 98.4 horse and 1.6 motor, are now 52.4 horse and 47.6 motor.

It will probably be news to some, and a relief to those interested in heavy wagon work, to know that by the Corporation Act of last session the Liverpool City Council obtained special powers to permit within the city wagons of a weight exceeding the maximum allowed, if properly used, should have an appreciable effect in reducing the cost of handling goods between the docks and the warehouses and railways within the city.

As to the effect of speed on traffic congestion within the city, traffic returns were recently taken. On a length of a line of dock streets where horse haulage was almost wholly used in pre-war times, and where the horse truck still represents about 53 per cent. in the traffic census, all traffic shows a reduction in total weight carried, the speed being still largely dominated by the speed of horse haulage. On a parallel street farther from the docks, where 73 per cent. by weight of the traffic is now motor-propelled, the tonnage has increased twofold, though, to judge by appearances, the latter street is no more congested than was formerly the case.

Another, and perhaps more remarkable, illustration is to be found in the fact that where the average speed of heavy motor wagons is usually high, as in the case of portions of Queen's Drive, there appears to be no congestion whatever on a roadway 24 feet wide, whereas in Regent Road (docks area), 39 feet wide, with slow horse traffic probably not averaging a speed of 2½ miles per hour, the congestion is at times very noticeable.

A common fault with motor wagon drivers is the use they so frequently make of the business and shopping streets in the center of the city.

As motor traffic, both light and heavy, increases, a matter which is becoming of greater importance is the control of traffic coming in from unimportant side roads into main traffic roads. Speeds will continue to increase, and within the boundaries of cities average speeds of 20 to 30 miles an hour will have to be provided for for passenger services.

Street-cars occupy about one-third of the average street surface, and are liable for the cost of maintenance of the street surface as well as the permanent way within statutory limits, which extend to 18 inches outside the outer rails on each side, while the motor 'bus, though using the surface of the street in common with other vehicles, has been found to do very severe damage to the older street surfaces, thus causing extra cost in maintenance. There can be no doubt that the future will see a struggle between these two systems of passenger transport. Both have conditions under which they show to advantage, but for the present the motor 'bus labors under the very great disadvantage of not being able to carry the same number of passengers as the street-car. So long as the motor 'bus costs per vehicle are equal to those of the street-car, it would appear that the street-car is likely to hold its own. On the other hand, where the number of passengers is small, or where the distribution of passengers throughout the day varies considerably, the 'bus is likely to have the advantage, and also in cases where the streets are narrow for the volume of traffic using them.

As all improvement in street pavement tends in the direction of smoother surfaces, it is likely that no motor 'bus, which must be heavy and heavily loaded, will be able to travel safely at such high average speeds unless it is provided with a track to itself, and it is even then somewhat doubtful whether it could accelerate and particularly decelerate quickly as well, unless guided in some way by projections above the track surface which would protect it against the evils of side-slipping and skidding at high speeds under unfavorable conditions of weather and street surface.

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Why Uniform Traffic Laws and Rules Are Needed

By D. C. FENNER

Manager, Public Works Department, International Motor Company

ANY discussion and understanding of uniform legislation as affecting highway traffic and highway transport must be based upon a thorough knowledge of the political structure of the governmental units in which highway traffic and highway transport prevail. This observation seems almost axiomatic and perhaps superfluous, yet too often in voicing the desirability and need for uniform motor vehicle legislation we overlook the fact that motor vehicles in their operation pass through the border lines of and come in turn, under the jurisdiction of municipalities, counties and states.

As for municipal control over highway traffic and highway transport, the kind and degree of such control is dependent either upon the constitutional rights which any state may give to its municipalities, or upon the laws which states have enacted delegating more or less of their own power on the subject to some or all such municipalities.

While it is true that as a general rule the municipalities may not enact ordinances regulating highway traffic and highway transport along lines in conflict with the provisions of the general state motor vehicle laws, nevertheless, there are numerous important exceptions to this rule. Then, too, there are matters such as the regulation of motor vehicle operation in front of schools, churches, and on fire street, etc., which are matters of local concern and are usually left to the municipalities for regulation.

By a process of elimination, therefore, we arrive at the fact that under present conditions ultimate control in the matter of legislation governing highway traffic and highway transport lies in the legislatures of our various states. It is to these state legislatures, therefore, that, in the last analysis, we must look for that vital and important end—namely, uniformity of motor vehicle laws and uniformity of enforcement.

Uniform legislation does not mean, necessarily, that all states should adopt one and the same law, identical in all their provisions. This might be considered the ideal condition, but from a practical standpoint, it is not necessary. What is needed, however, is uniformity in those sections of the state laws that deal with definition of terms, traffic regulations, hand signals, qualifications for drivers, size and weight restrictions, obligatory equipment of a vehicle, head-light laws, and disposition of license fees.

Let us take a specific instance to illustrate this point: From the standpoint of the trucking business, which is to-day assuming very large proportions, no factor is more important than that the various states and their political subdivisions should impose one and the same set of rules and regulations governing the weight limits which such trucks are allowed to carry. A very encouraging procedure in the states of Connecticut and New Jersey restricts the load upon a motor truck to the manufacturer's rated capacity of the vehicle. As the enforcement of this provision will absolutely prevent over-loading, it gives the manufacturers a chance to coöperate with the state highway engineers in the design and proper rating of vehicles for the protection of the highways.

The standard specification for a motor truck chassis now contains the allowable gross weight of the chassis and body and load, and also the actual chassis weight. It is possible that these two weights will be the only ones stamped on the truck caution plate by the manufacturer, and that the actual weight of body and the resultant pay-load capacity must be stamped on the plate by the owner of the truck before he can obtain his vehicle license plates. Similarly in the operation of passenger-cars there are virtually as many laws on the subject of head-lamps and head-lighting as there are states in the union, and no one starting out on a tour is able to be sure that perhaps at any moment or at any place he will not be arrested and severely penalized for the breach of some law or regulation at variance with the ones of his own state with which he is familiar and whose observance has become a matter of habit.

This wide variation in state motor vehicle laws and the unsatisfactory conditions resulting therefrom are greatly aggravated when there are local ordinances additional to or at variance with those laid down in the state laws. Obviously, therefore, the economical operation of a motor vehicle, even within the confines of a state becomes more or less of a gamble.

The remedy for these unsatisfactory conditions lies, of course, in uniformity of state laws having to do with the operation of motor vehicles and uniformity in county or other municipal ordinances. Furthermore, the local ordinances must in every respect conform to the general principles set forth in the uniform state laws.

Several movements to accomplish this end have been begun, but the one which has attracted the most support and has gained the greatest headway is that which is now being sponsored and furthered by the Motor Vehicle Conference Committee, an organization composed of representatives from the American Automobile Association, Motor & Accessory Manufacturers' Association, National Automobile Chamber of Commerce, National Automobile Dealers' Association, Rubber Association of America, and the Trailer Association of America. Their views on the matter of uniform state legislation are set forth in a so-called proposed Uniform Motor Vehicle Law and Proposed Uniform Anti-Theft Law. To be sure, these measures contain many features to which persons have taken exception, and it is quite possible to point out sins of commission and omission in their provisions. Nevertheless, their recommendations reflect the views of able and experienced men in matters having to do with highway traffic and highway transport, and it is gratifying to know that many of the recommendations of these two proposed laws are finding their way, if not *verbatim*, at least in principle, into many of the laws of our various states.

More important, however, than this is the fact that the extensive and intensive work that has been done in advocating the proposed Uniform Vehicle Law and Proposed Anti-Theft Law have brought home to the public and their law-makers the fact that the time has come when uniformity in the regulation of highway traffic and highway transport is absolutely necessary for the safety and convenience of vehicular and pedestrian traffic.

Motor Transport in Russia

The Soviet Government has sanctioned the partial emancipation of motor transport vehicles and repair shops from exclusive government use and ownership. The project contemplates their transfer by present holders, as well as permission for purchase and operation, to coöperative and business establishments (but not to private owners), subject to special registration permits in each case.

The buying of automotive vehicles and parts for all and any establishments is concentrated in the hands of a purchasing commission under Professor Lomonosof. The requisitioning and compulsory transfer by the authorities of vehicles in use are abolished.

The number of automotive vehicles of all descriptions in actual use in Soviet Russia on October 1, 1921, was about 10,000, out of a total number of 23,000 motor vehicles registered. In 1918 there were but 3,000 machines in all Russia fit for use. The number of vehicles held by the War Department has decreased somewhat for the past year, while the number held by the branches of the Department of Local Transport increased to about 3,000; the Commissariat of Approvisation has 1,508 cars; the Council of National Economy 1,010; the Commissariat of Sanitation 890. A number of vehicles were recently turned over to the coöperative Union, which had 420 machines on October 1.

Motor trucks form 53.9 per cent. of the entire automotive transport in actual use. They are classified by type and capacity and divided into 84 squadrons or divisions.

There were on October 1, 1921, 167 repair shops and automobile plants in Soviet Russia, as against 153 in January, 1920. The capacity of all this equipment is expressed in 6,500 complete chassis overhaulings per year.

In 1921 there were about 55,000 drivers, mechanics and garage repairmen actually employed in automotive transport, or an average of about 6 persons per machine in use and 2.4 per registered vehicle. Of the above number 11,500 were in Moscow, 2,900 in the Caucasus, 2,600 in Petrograd, 2,500 in the Ukraine and the rest scattered.

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Truck Transport Improperly Regarded

By J. T. W. KASTENDIECK

Manager, Motor Truck Sales, Packard Motor Car Company of New York

THE motor truck is purchased as a means of livelihood, a source of profit, or for the shipment of product by the farmer, merchant or manufacturer. Each in turn is entitled to a reasonable return on his investment, but is subject to the operation of the same economic laws as govern other operations in business. There is no separate general law applying to the profit or loss of motor truck operation.

Economy of time does not apply to speed any more and often less than it does to the proper loading facilities, selection of adequate tonnage carrying size, attention to up-keep before major troubles force a lay-up or serious accident, and the employment of competent operators.

Many drastic laws are written into our statute books because of the abuse of privilege, and the operation of motor trucks at high speed by reckless drivers, especially when in poor condition, constitutes such a menace to life and property that it is frequently the basic cause of obnoxious and sometimes unfair legislation.

Truck owners, themselves, are probably advocates of the elevation or depression of railroad tracks through cities and the installation of gates and warning signals at crossings. Why, therefore, should they not, in their own interest, keep their equipment in the best possible operating condition, load it to rated capacity and govern it to a rational speed limit? The return will be lowered cost of operation, more consistent schedule, and less reason for drastic legislation.

The problems of the manufacturer and dealer arose and arise from varying legislation in the different states and from merchandising conditions resulting from methods of expediency resorted to at a time of stress when inventories, money market stringency and high rates excused to some extent the lapse from fundamental policies.

The buyer is warranted in seeking the best investment in the purchase of motor equipment as much as in the purchase of any other merchandise or commodity. The principle, "Let the Buyer Beware," is as true here, however, as in any other transaction. Not only may he find that the high allowance for his used vehicle was a false bargain, but that encouragement of over-allowance has reacted upon his own line of business, because no trade evil can become widespread without exerting a general influence on business morale and business morals.

Discounts properly figured and taking into consideration total amount of purchase as related to cost of production is standard business practice. Discounts based on the price the buyer is willing to pay and having no regard for volume of purchase or cost constitute a pernicious practice that, if persisted in, leads either to failure, or, if provided for in an inflated list price, amounts to business gambling and not sound business practice.

Used truck allowance has been widely heralded as an outstanding evil of the motor industry only because of its abuse. There is a market for used trucks at a right price, the price representing value in service that may still be expected from the used vehicle either "as is," "reconditioned" or "rebuilt." The evil consists in over-allowances that either wipe out profit or result in an effort to secure a price exceeding value. Thus what can be and has been organized into a legitimate business with an established satisfied clientele has fallen into disrepute, and auction counter tactics prevail to such a degree that the buyer approaches the purchase on the basis of bidding and with suspicion.

The motor truck, a necessary part of our transportation trinity, deserves the observance of the best business practice in its merchandising. There are methods of competition that are destructive to the adversary, but it should be remembered that those methods are often self-destructive as well. The buyer may chuckle and feel well pleased at a high allowance for the remains of what was once dignified by the name of motor truck, but for which any self-respecting junk man would hesitate to give $50. But that buyer is already beginning to realize that somebody always "pays the freight" and that such practice is bound to lead to disaster, and in disaster inflated values deflate and his wonderful bargain may become an orphan without even an asylum in which to take refuge.

It is well to talk "normalcy," but it is better to act "normalcy" and thereby hasten the day of actual resumption and business balance. Reputable parts manufacturers are exercising a careful discrimination based upon experience, and the truck buyer may well exercise a like discrimination and analyze his proposition, since the buyer's problem is one of ability and dependability of his truck, the service behind it and the security of his investment, and the last is not the least of these.

True business building visualizes the future while it guards the present. Pernicious practices are difficult to cure. Now is the time to take the anti-toxin injection and let the motor truck advance on its merit as a freight carrier. No American brought up to the principle of fair play wants to win a fight on a foul. It is the straight, clean knock-out to the jaw that wins applause.

The necessities of an expanding civilization, the demands of trade and commerce, the development of our natural mineral resources, the growth and concentration into great communities of one population made inadequate the existing railroad transportation, and the speeding up of industrial life required a more enduring and faster means of transport than the horse-drawn vehicle, so the motor truck entered the freight transportation field. Store-door delivery is still in the minds of the railway administrators and the development of the container system to its greatest possible utility apparently is principally dependent upon the settling of the railroad situation and financing. At present, however, the short haul remains the special function of the motor truck, for not only does the motor truck move its load at less expense when the cost of cartage at both ends of the line, the cost of crating, and terminal charges are considered, but it does its work more directly in less time and therefore more efficiently within the radius of its best performance.

Ultimately without doubt, each transportation division—rail, water and road—will determine its most profitable function as a carrier and confine its activities to that function, although the operators of each will unquestionably find constantly growing opportunities for expanding their own activities without seriously affecting the activities of the others. The most serious interference with progress in motor truck expansion is legislative. This interference is made more serious because there is, first, a lack of understanding in some quarters of the fundamental principles underlying successful motor freight transportation; second, because of highway conditions already referred to, and third, and not least, because there is an economic basis that lends plausibility to the restrictions.

IT IS true that in the past, motor trucks have been even grossly overloaded, dangerously overspeeded, and frequently operated with tires worn almost to the rims. These conditions, especially during the early spring months over roads not constructed to carry the traffic, have resulted in destruction, the repairing of which has been costly to the communities involved and have caused such condemnation of truck operation on the highways that legislative bodies have readily seized upon these reasons for increasing license fees, often exorbitantly, and decreasing tonnage carrying capacity often ridiculously.

Granting that some beneficial results will follow the enforcement of these laws and also granting that nothing will stop the progress of motor highway transportation, much inconvenience, hardship and even injustice result from marked differences in the laws of the several states and too close adherence to the letter of the law in its enforcement. The inconvenience of difference will finally be obviated by a uniform vehicle law toward the building up of which all motor truck associations should direct active effort. Excessively rigid en-

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forcement of drastic laws restricting loading is often the result of lack of knowledge of legislators and enforcement officials of the conditions surrounding operation.

Exact knowledge of load weight can only be obtained by weighing either the load or weighing and marking the packages before loading and computing the weight from the package markings. Scales are not often available and weighing packages before loading means shipping delay or increase of employees, both signifying increased cost. Increased cost, being passed back to the consumer, means delay in lowering the cost of living. Guessing at load weights means that, frequently with the best intention, there is a slight excess of gross weight, and in some of our states a lack of flexibility in the law enforcement subjects the owner or operator to fine or delay. Where the shipping consists of packages or cases of equal weight the shipper can easily conform to any law by regulating his body size to suit the conditions, but in the hauling of mixed merchandise the problem of compliance with regulation is not so easy, therefore a reasonable judgment should be exercised by officials.

The difficult position of lawmakers is easily understood. They stand between the fire of a general public opinion influenced by constantly increasing taxes and the protests of transportation interests. It is therefore not difficult to understand that perplexity and bad judgment lead to error.

It is up to us to preach the gospel of highway transportation, to point out to the state that motor truck hauling is an asset and not a liability; that through it food reaches the city more quickly, in better condition, and at less cost; that it solves the problem of l. c. l. shipments, and brings promptly to the isolated the comforts of the more settled communities. It keeps the boy on the farm and calls back labor to the land. It develops the idle lands of the state, thus bringing income to the state.

Book on Highway Transport

A comprehensive outline of highway transport from the time when aboriginal man discovered the first wheel to the present moment has been prepared by Professor Lewis W. McIntyre, Assistant Professor of Civil Engineering, University of Pittsburgh, for the Highway and Highway Transport Education Committee. Although making no pretense of being complete, the outline treats exhaustively of the various phases which make highway transport one of the dominant subjects of the day. It was prepared at the urgent insistence of schools of engineering and economics, highway engineers and highway officials. The outline is expected to be the forerunner of text-books on the subject, to which many of the leading economists and engineers in the country are giving their attention.

Milk Supply Shipped by Truck

Approximately 90 per cent. of the milk consumed in Los Angeles, 75 per cent. of the bread and 500,000 pounds of fresh meat daily are delivered by motor truck.

The Reliance Motor Truck Company, Appleton, Wisconsin, has gone into voluntary bankruptcy. It made Badger truck axles as well as Reliance trucks.

EXPORTS OF MOTOR TRUCKS AND PARTS, MARCH, 1922.

COUNTRIES.	MOTOR TRUCKS AND BUSES—1-Ton and less. (No.)	(Value.)	Over 1 to 2½ Tons. (No.)	(Value.)	Over 2½ Tons. (No.)	(Value.)	PARTS. (Value.)	ELECTRIC TRUCKS AND CARS. (No.)	(Value.)
Europe—									
Azores and Madeira Islands	4	$ 1,699	...	.....	..	.....	$ 54	..	.....
Belgium	...	.....	...	.....	..	.....	12,703	..	.....
Denmark	1	250	...	.....	..	.....	132,268	..	.....
Finland	10	4,247	...	.....	..	.....	343	..	.....
France	...	.....	...	.....	..	.....	66,458	..	.....
Germany	...	.....	10	$ 15,000	..	.....	3,542	..	.....
Gibraltar	...	.....	...	.....	..	.....	20	..	.....
Greece	...	.....	...	.....	..	.....	3,779	..	.....
Iceland and Faroe Islands	...	.....	...	.....	..	.....	486	..	.....
Italy	...	.....	...	.....	..	.....	7,591	..	.....
Lithuania	...	.....	...	.....	..	.....	276	..	.....
Malta, Gozo and Cyprus Islands	...	.....	...	.....	..	.....	1,641	..	.....
Netherlands	10	4,247	4	6,365	..	.....	9,481	..	.....
Norway	32	13,591	3	2,813	..	.....	3,097	..	.....
Poland and Danzig	...	.....	...	.....	..	.....	35	..	.....
Portugal	...	.....	...	.....	..	.....	1,589	..	.....
Roumania	...	.....	...	.....	..	.....	2,248	..	.....
Spain	...	.....	2	2,000	..	.....	28,054	..	.....
Sweden	15	6,371	2	2,112	..	.....	15,303	..	.....
Switzerland	...	.....	...	.....	..	.....	2,209	..	.....
England	5	3,868	...	.....	..	.....	423,933	..	.....
Scotland	...	.....	...	.....	..	.....	401	..	.....
Ireland	1	506	...	.....	..	.....	5,200	..	.....
Jugoslavia, Albania, etc.	...	.....	...	.....	..	.....	2,787	..	.....
Latvia	...	.....	...	.....	2	3,800	.....	..	.....
North and South America—									
Bermuda	...	.....	...	.....	..	.....	66	..	.....
British Honduras	...	.....	...	.....	..	.....	717	..	.....
Canada	32	23,632	51	72,547	27	66,725	1,736,658	..	.....
Costa Rica	...	.....	...	.....	..	.....	971	..	.....
Guatemala	...	.....	...	.....	..	.....	841	..	.....
Honduras	...	.....	1	200	..	.....	1,254	..	.....
Nicaragua	...	.....	...	.....	..	.....	187	..	.....
Panama	2	849	...	.....	..	.....	2,745	..	.....
Salvador	...	.....	...	.....	..	.....	377	1	$ 1,809
Mexico	23	13,270	8	9,550	4	14,626	112,310	1	62
Newfoundland and Labrador	...	.....	...	.....	..	.....	2,563	..	.....
Barbados	...	.....	...	.....	..	.....	855	..	.....
Jamaica	7	2,972	1	1,610	..	.....	7,270	..	.....
Trinidad and Tobago	...	.....	1	1,524	..	.....	11,745	..	.....
Other British West Indies	3	1,099	2	3,846	..	.....	1,553	1	300
Cuba	30	14,684	...	.....	..	.....	73,482	..	.....
Dominican Republic	...	.....	...	.....	..	.....	3,421	..	.....
Dutch West Indies	...	.....	1	2,000	1	3,500	2,673	..	.....
French West Indies	...	.....	...	.....	..	.....	1,373	..	.....
Haiti	...	.....	...	.....	..	.....	2,791	..	.....
Virgin Islands U. S.	...	.....	...	.....	..	.....	705	..	.....
Argentina	...	.....	8	10,874	..	.....	421,480	..	.....
Bolivia	...	.....	...	.....	..	.....	307	..	.....
Brazil	...	.....	...	.....	..	.....	15,176	..	.....
Chile	8	3,397	1	1,052	..	.....	9,493	..	.....
Colombia	2	849	...	.....	..	.....	5,443	..	.....
Ecuador	...	.....	...	.....	..	.....	1,790	..	.....
British Guiana	...	.....	...	.....	..	.....	2,054	..	.....
Dutch Guiana	...	.....	...	.....	..	.....	64	..	.....
Peru	1	500	...	.....	..	.....	11,315	..	.....
Uruguay	...	.....	...	.....	..	.....	17,497	..	.....
Venezuela	...	.....	...	.....	..	.....	7,102	..	.....
Asia—									
Aden	...	.....	...	.....	..	.....	177	..	.....
Ceylon	...	.....	...	.....	..	.....	434	..	.....
China	8	4,350	1	506	..	.....	5,096	..	.....
Kwantung	...	.....	...	.....	..	.....	4,684	..	.....
Chosen	...	.....	...	.....	..	.....	1,105	..	.....
British India	...	.....	10	13,564	8	8,999	37,829	..	.....
Straits Settlements	...	.....	...	.....	..	.....	6,636	..	.....
Other British East Indies	...	.....	...	.....	..	.....	15	..	.....
Other Dutch East Indies	...	.....	...	.....	..	.....	2,445	..	.....
Java and Madura	...	.....	...	.....	..	.....	37,864	..	.....
French Indo-China	...	.....	1	1,080	..	.....	2,748	..	.....
Hejaz, Arabia and Mesopotamia	...	.....	...	.....	..	.....	2,261	..	.....
Hongkong	...	.....	...	.....	..	.....	3,201	..	.....
Japan	100	49,888	15	27,876	4	8,967	36,036	21	41,760
Palestine and Syria	33	14,016	...	.....	..	.....	17,492	..	.....
Philippine Islands	...	.....	4	6,760	..	.....	39,296	..	.....
Greece in Asia	...	.....	...	.....	..	.....	1,199	..	.....
Siam	...	.....	...	.....	..	.....	762	..	.....
Oceania.									
Australia	7	5,911	28	40,809	2	2,513	117,467	12	8,817
New Zealand	...	.....	13	19,678	..	.....	29,221	..	.....
Other Brit. Oceania	...	.....	...	.....	..	.....	294	..	.....
French Oceania	...	.....	...	.....	..	.....	474	..	.....
Other Oceania	...	.....	...	.....	..	.....	595	1	600
Africa—									
Belgian Kongo	15	5,376	...	.....	..	.....	13,622	..	.....
British West Africa	...	.....	3	3,210	..	.....	5,050	..	.....
British South Africa	5	3,978	...	.....	3	11,500	27,714	4	3,978
British East Africa	...	.....	...	.....	..	.....	326	..	.....
Canary Islands	...	.....	3	2,889	..	.....	4,409	..	.....
French Africa	...	.....	...	.....	..	.....	1,397	..	.....
Egypt	12	5,247	...	.....	..	.....	9,127	..	.....
Morocco	...	.....	...	.....	..	.....	5,881	..	.....
Portuguese Africa	...	.....	...	.....	..	.....	11	..	.....
Portuguese E. Africa	...	.....	...	.....	..	.....	1,895	..	.....
	366	$184,797	173	$248,865	51	$120,630	$3,596,539	41	$57,884

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70%

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THE amount of a truck maker's business nowadays is measured by the amount of his truck sales. SMITH WHEELS help sell trucks. They first sell the eye, then their performance helps keep the truck sold.

In selling trucks equipped with wood wheels in this metal age, the wood wheels in themselves put up a great sales resistance.

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Trade Reviving Too Fast?

"Whether the motor vehicle business is to continue at the present rate is largely a matter of whether it has been outdistancing by too wide a margin the general improvement in other lines."

So spoke C. S. Mott, vice-president and head of the advisory staff of General Motors Corporation, in a recent statement.

"If it has, there may be expected a recession until other business has advanced to a point where the need for transportation again asserts itself.

"The motor vehicle as a means of business will always be in the advance of a general business movement. It is because of this that the industry was favored with the big buying movement of the present season. It is a season that was confidently looked forward to in the industry, though in volume it has exceeded the early expectations.

"Because of the general use of the motor vehicle in business the standardized production vehicle of to-day will continue to be generaly accepted. The desire for individuality in design or appearance is the exception but will be met by manufacturers at higher prices as affording a certain volume of outlet for their product.

"Steady progress is being made toward reducing the operating and maintenance costs of machines, and as these improvements are perfected and incorporated into present vehicles there will be an increasing market for the manufacturer. New price classes will be opened in the next five years which will bring thousands of potential owners into the buying market.

"The development of highways in the next few years will also have an important part in the general advance of the industry. As it makes it more possible for owners to realize on the inherent time-saving capabilities of their vehicles, they will become more and more indispensable in business. Indiscriminate speeding as it is known to-day will be eliminated with the construction of highways with space for both fast and slow moving vehicles. There is also much to be accomplished in the perfection of safety devices and provision for overhead crossings in cities."

Warns Against Overproduction

Danger of tire overproduction is expressed in a recent statement of Harvey S. Firestone, president of the Firestone Tire & Rubber Company. He said:

"Our information shows that there is a large overproduction in tires now in many sizes and types. In fact the demand all along the line has hardly kept pace with production, and as a consequence a surplus has been piling up.

"It is expected that the usual increase in trade sales during the coming summer months will absorb this surplus, and I hope this will enable the rubber industry to maintain its present production schedule late into the autumn months.

"We have no plans at present for a Firestone increase in production and therefore we are not hiring additional help. The demand for original equipment from motor vehicle manufacturers is the chief cause of the present high point of tire production in Akron. Whether this demand will be maintained is uncertain. As far as I can see there is nothing in sight to warrant the belief that the tire industry will go much beyond its present production this year."

Mr. Firestone's warning comes in the face of one of the greatest booms the tire industry has known, not even excepting the then unprecedented spurt of early 1920. Every tire company in the city is producing to its limit and is crying for more men, advertising for them in other cities and raising wages as an added attraction.

Tire output has been over 85,000 a day for more than six weeks and is steadily increasing. Firestone is running between 24,000 and 25,000 a day, and Goodyear has reached 26,000 a day. Unofficially it is said that Goodyear is considering a temporary production of nearly 30,000 a day, provided men are available, in order to catch up with orders and to replenish its exhausted finished goods inventory.

Front Axle for 'Buses

The Shuler Axle Company of Louisville, Kentucky, has completed arrangements for quality production on a line of front axles intended conclusively for use on motor 'buses. Manufacturer of the new axle will be a regular part of the Shuler production program in the future. The company, for several years, has been making front axles for trucks, trailers and tractors, and these lines will be continued and enlarged.

The development of the special Shuler 'bus axle was necesitated, according to General Manager F. A. Shuler, by the demand for a front axle that would meet the peculiar needs of the motor 'bus. Most manufacturers have been trying to build 'bus bodies on the regular truck chassis, and the change in design most insistently demanded calls for a lower frame and wider tread, which secures greater stability and makes for easier loading. To meet the demand Shuler has brought out a front axle of extra strong and heavy design, with the spring-pad full 7 inches lower than the ordinary 'bus axle. The axle has a large factor of safety and large journal surfaces, insuring long wear and service under heavy duty. The material specifications and essentials of design are in exact accord with the regular Shuler line. For the new axle the specifications are as follows:

Axle Center:—Drop-gored in a single piece from S.A.E. special 1035 30-40 carbon steel, and thoroughly heat-treated. I-section continuous throughout its length without weld, and designed to develop maximum strength with minimum weight. Yokes bushed with steel bushings, carbonized, hardened and ground.

Steering Knuckles and Arms:—Drop-forged from S.A.E. special 3135 chrome-nickel steel and thoroughly heat-treated.

Rod End:—Drop-forging, specially designed with two clamping bosses to provide a positive clamp on rod, with a deep drop to permit cross-rod to pass under spring.

Cross-Rod:—Cold-drawn steel, placed on rear of axle and bent cold with large radii in the bends.

Knuckle-Pin and Steering-Ball:—3½ per cent. nickel steel, carbonized, hardened and ground.

Hubs:—High-grade malleable iron, provided for wood wheels. Steel wheels of integral hub type, specially designed for this axle, also available.

Wheel Bearings:—Timken tapered roller series, with fine and simple adjustment on the spindle.

Locking Washer:—Provided to prevent wheel coming off spindle in case of destruction of wheel bearing.

Ball Thrust-Bearing:—Interposed between knuckle and upper yoke of axle center to absorb thrust load and insure easy steering.

Railway Buys Rail Motors

Purchase by the Great Northern of four rail motor 'buses is the initial step in a determined effort to combat competition of highway motor transports, according to President Budd. Each of four main districts will be allotted one 'bus, the first to be placed in service in June and the other three by July 4.

Previous experiments with rail motor 'buses indicate that they are economical and efficient in short-line service. Local transportation experts say the use of such passenger equipment by the Great Northern is an effort to retain existing traffic, and win back that diverted to the highways by expansion of the "jitney" and its larger successors.

The Northern Pacific has one 'bus in operation on the Gilmore & Pittsburgh, a subsidiary in Idaho and Montana, but still considers it an experiment. The Great Northern will operate two 'buses on Minnesota lines, one with a trailer in northern Minnesota and the other in southern Minnesota. The other two will be used in Washington and in Montana. Four makes are to be used to determine practicability—the Mack, the Service, the White and the FWD.

"The railroads must meet motor 'bus competition," said President Budd. "We will use the rail 'buses where we think they will afford the best opportunity to determine whether they do meet this competition."

7,494 Trucks Into Canada

A statement in House of Commons showing extent of Canada's importation of automobiles during the last five fiscal years, gives the following statistics:

Fiscal Year.	Cars.	Value.	Trucks.	Value.
1922....	7,181	$ 9,501,362	806	$ 1,534,765
1921....	5,907	8,399,537	1,706	3,598,938
1920....	10,805	11,204,461	2,274	3,831,084
1919....	6,475	5,326,510	1,744	2,274,748
1918....	16,118	11,317,245	964	1,275,179
Totals..	46,484	$45,749,115	7,494	$12,497,714

The duty collected on automobiles totaled $15,960,122 and on trucks $4,253,438. Automobile parts and accessories worth $47,979,170 were imported.

The bulk of these importations was from the United States and, after 1920, represented the more expensive type of machine, which is not manufactured in Canada. About 1920 the Canadian manufacturer developed the cheaper vehicle to a point where he virtually controls the market

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General Motors Trucks

To be the possessor of a GMC dealership is to be the one man in your community with the privilege of selling a line of motor trucks with exclusive features of construction which have advanced motor truck transportation further, in the past two years, than it had been advanced in the preceding decade.

No dealer, selling any other motor truck, can obtain the advantages possessed by the GMC selling organization in the quality of the product, in the organization that builds it, and in the price at which it is sold.

GENERAL MOTORS TRUCK COMPANY—*Pontiac, Michigan*
Division of General Motors Corporation

1 Ton $1295 *2 Ton $2375* *3½ Ton $3600* *5 Ton $3950*

Chassis Only—At the Factory—Tax to be Added

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Buda Engine Service Co.
1055 Broadway
Denver, Colo.

Motive Parts Co. of America, Inc.
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Indianapolis, Ind.

Maxey Bros. Automotive Parts Co.
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Columbia Motor Truck and Supply Co.
117 S. 7th St.
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Imperial Garage Co.
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Swain-Hickman Co.
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Wherever he may be, the owner of a Buda-powered truck, motor coach, taxicab, tractor or other equipment is assured prompt and efficient parts service. He can count on steady working and continuous profits. The thirty completely equipped Buda parts service stations being operated throughout the United States furnish another reason why it pays to adopt the Buda engine, "built for a purpose."

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Nickles & Gentry
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Truck Sales & Service Co.
Eldorado, Kans.

Gaines Motors Sales Co.
Wichita Falls, Texas

Lawrence Process Co.
Dallas, Texas

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835 LARKIN ST.
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Automotive Parts Co.
1900 Telegraph Ave.
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Henderson Brothers
916 12th St.
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SUNSET ELECTRIC CO.
1507 BROADWAY
SEATTLE, WASH.

ELECTRIC EQUIPMENT CO.
1240 S. HOPE ST.
LOS ANGELES, CALIF.

H. G. BURFORD & CO., LTD.
75 EVERSHOT ROAD
STRAND GREEN
LONDON, N-4, ENGLAND

Motors Service Corp.
Monte 483
Havana, Cuba

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M. & A. M. A. Meeting

Past, present, and future conditions in the automotive industry will be measured and analyzed at the sixth annual fall convention of the Motor & Accessory Manufacturers' Association on September 13, 14, and 15, 1922. The place of the meeting has not yet been determined.

For the last few years this convention has been primarily a conclave of credit managers and other financial executives of the four hundred unit and equipment makers affiliated with the association. This year, however, the scope of the conference will be widened and, in addition to the general sessions devoted to discussing the current problems of the automotive industry, there will be specialized departmental meetings of advertising managers, traffic managers, and export managers.

The autumn meeting of the association is regarded as one of the most significant business conventions of the year. It affords an unexcelled chance to take stock and determine who's who and what's what in every branch of the trade. The convention is a business Mecca for the leaders of the industry who come, not to parade vague promises and hollow generalizations, but to exchange ideas and viewpoints on the paramount factors influencing the automotive industry in all its aspects.

Reduces Accidents 45 Per Cent

Motor vehicle accident injuries have reduced in Massachusetts from 21,086 in 1920 to 11,487 in 1921, a decline of 45 per cent. The total of accidents and fatalities will be still further lowered in 1922 if the rate for the first 5 months is maintained. The revocation of 4,899 licenses during 1921 has had a stimulating effect on careful driving.

A new record of 4,464 applications to drive motor vehicles was established in New York City during the last week of May. A new record for a single day was set with 1,044 license applications.

DENBY
MOTOR TRUCKS

Model 33, 1½-2 Ton Bus

Operated by

STAR TRANSPORTATION COMPANY
MASON CITY, IOWA

SWIFT - ECONOMICAL - POWERFUL

Denby Motor Truck Company
DETROIT, U. S. A.

There is a bushing at every wearing point in the Pierce-Arrow mechanism. These bushings take the wear. They are "parts insurance" saving costly replacements. Check this vital item in the truck you think of buying.

Pierce-Arrow
TRUCKS

The Pierce-Arrow Motor Car Company
Buffalo, New York

2-ton $3200 3½-ton $4350 5-ton $4850 fully equipped

The Wisconsin Service Co., Inc., Milwaukee, Wisconsin
41 Trucks Heil Equipped Last Season.
"Heil Bodies and Hoists saved us time, earned money and gave satisfaction. More cannot be said of equipment."

HEIL BODIES AND HOISTS CUT ROAD BUILDERS' COSTS

The partitioned body for concrete road work eliminates hand labor and speeds up construction. Every contractor is interested in reducing costs. Show him the partitioned Body and Hydro Hoist which can give a 58 to 60 degree dumping angle. You'll make sales and with them a handsome profit. Write for proposition.

THE HEIL CO.
1140 Montana Ave. Milwaukee, Wis.

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New York, Chicago, San Francisco, Washington, D. C., Richmond, Cleveland, Pittsburgh, St. Paul, Sioux City

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BROWN-LIPE-GEAR
TRANSMISSIONS
CLUTCHES CONTROL SETS

BROWN-LIPE-CHAPIN
DIFFERENTIALS
DRIVE GEARS DRIVE PINIONS

Both at Syracuse, N.Y.

Announcement

Being convinced that a fabric disc joint within its limitations offers certain advantages, we have supplemented our line of all-metal joints with a corresponding line of fabric disc joints and now offer them for early delivery.

The same quality of materials and excellence of workmanship which the trade attributes to our all-metal assemblies are incorporated in our fabric disc joint assemblies.

We solicit an opportunity to familiarize you with certain original features and details of our new design.

Making both lines, i. e., all-metal and fabric disc joints, you may rest assured that our recommendations will be made on the basis of *your* needs.

Blood-Brothers Machine Co.

Pioneer Builders of Universal Joints

ALLEGAN F. Somers Peterson Co. San Francisco, Cal. Western Representative MICHIGAN

BUYERS' GUIDE

AXLES.

Iron Mountain Company, Chicago.

BEARINGS.

U. S. Ball Bearing Manufacturing Company, Chicago.

BODIES.

Heil Company, Milwaukee.
Lee Trailer & Body Company, Chicago.
Wood Hydraulic Hoist & Body Company, Detroit.

CHAINS.

Whitney Manufacturing Company, Hartford, Conn

CUSHION WHEELS.

Smith Wheel, Inc., Syracuse, N. Y.

DIFFERENTIALS.

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Continental Motors Corporation, Detroit.

HOISTS.

Heil Company, Milwaukee.
Hough Mechanical Hoist Company, Chicago.
Wood Hydraulic Hoist Body Company, Detroit.

MOTOR FIRE APPARATUS.

American-La France Fire Engine Company, Elmira, N. Y.

MOTOR TRUCKS.

American-La France Fire Engine Company, Elmira, N. Y.
Autocar Company, Ardmore, Pa.
Denby Motor Truck Company, Detroit.
Federal Motor Truck Company, Detroit.
General Motors Truck Company, Pontiac, Mich.
International Harvester Company, Chicago.
International Motor Company, New York.
Pierce-Arrow Motor Car Company, Buffalo.
Vim Motor Truck Company, Philadelphia.

TRAILERS.

Lee Trailer & Body Company, Chicago.

TRANSMISSIONS.

Brown-Lipe Gear Company, Syracuse, N. Y.

UNIVERSAL JOINTS.

Blood Brothers Machine Company, Allegan, Mich.

WHEELS.

Smith Wheel, Inc., Syracuse, N. Y.

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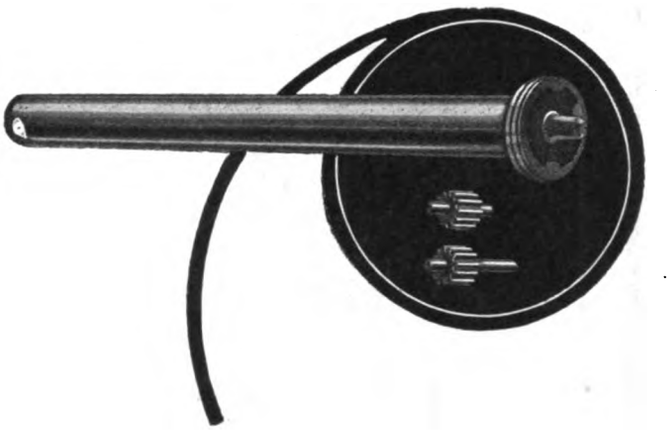

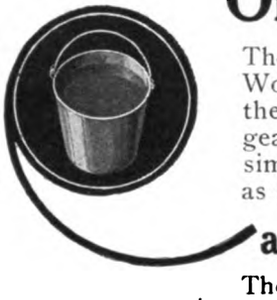

Only 3 Vital Parts

The vital working parts of the Wood-Detroit Hydraulic Hoist are the piston and the two cut steel gears of the pump—certainly as simple, dependable a mechanism as is possible.

and They Work in Oil

These parts, long-lived and naturally resistant to wear, work continually in oil. It is obvious that this hoist will outlast several chassis.

WOOD DETROIT

Hydraulic Hoists and Steel Bodies

are used on practically every make of truck and in every line of work where power dumping is employed.

We will gladly send details and quote prices. Merely tell us the make and model of chassis and commodity to be handled.

Wood Hydraulic Hoist & Body Company

4196 Bellevue Ave. Detroit, Mich.

Built by "Gar Wood"

Gar Wood Says:

"Simplicity and dependability are inseparable and they are vital reasons for the success of Wood-Detroit equipment."

Gar Wood

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It Takes a Good Truck
to live up to a good reputation

IT is one thing to get a good name and another to keep it.

The exceptional standing of Mack trucks and the reputation of their manufacturers are more widely recognized today than ever. And popular approval is a factor that the motor truck dealer cannot afford to ignore.

In talking Mack trucks you have an unexcelled record of growth to point to; you have a truck with more *significant* mechanical features than any other product of its kind; a career that is replete with one achievement after another in every field of motor transport service; and above all you can point to a measure of public approval enjoyed by few products.

The Mack franchise offers unusual opportunities to the right calibre of dealers. Write today for particulars and available territory.

Mack TRUCKS

Capacities: 1½ to 7½ tons.
Tractors to 15 tons.

INTERNATIONAL MOTOR COMPANY
25 Broadway New York City

Branches owned by this company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

"PERFORMANCE COUNTS"

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Investigate LATEST "WHITNEY"

LATEST ROLLER CHAINS HAVE SPECIAL QUALITY
SOLID ROLLS AND OTHER IMPORTANT IMPROVEMENTS

HIGH EFFICIENCY
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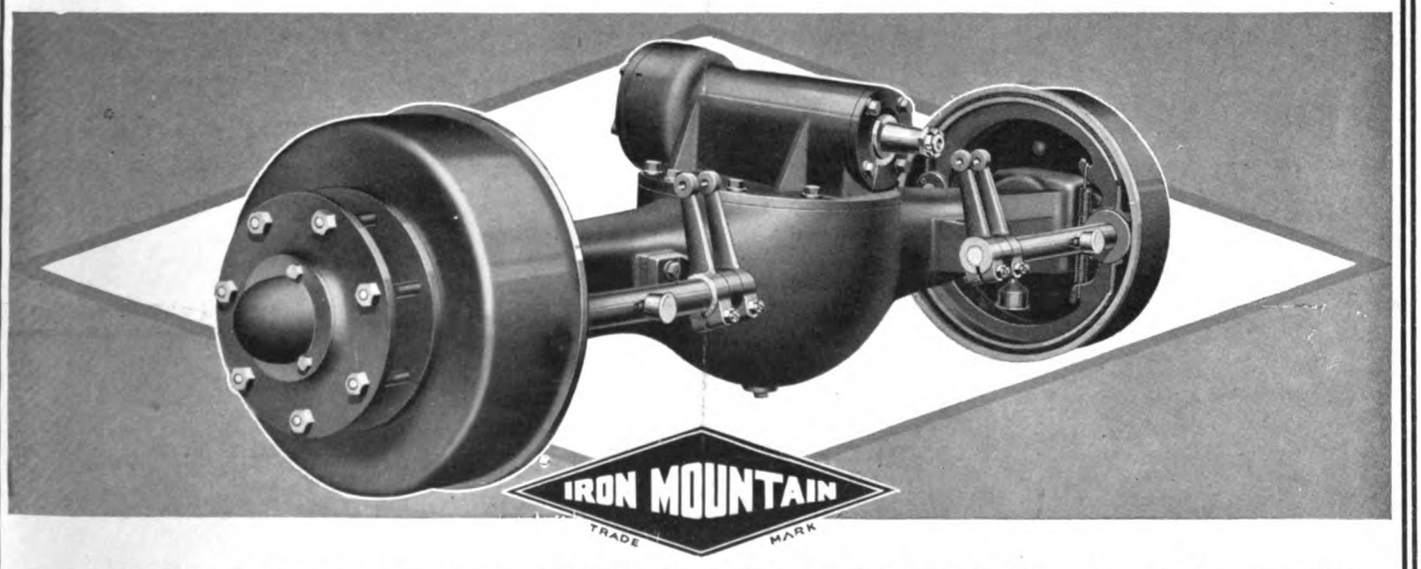
CHAINS
also *Low* Cost per *Thousand Miles* of Service

Front End Motor Chain Drives

EXCEPTIONAL MILEAGE AND NEVER KNOWN
TO SKIP THE SPROCKET TEETH

THE WHITNEY MFG. CO.
HARTFORD, CONNECTICUT, U. S. A.



WORM DRIVE TRUCK AXLES

¾, 1, 1½ and 2½ Tons. Designed Right—Built Right.

Guaranteed to give 100% satisfaction in strength and service. Tell us about your requirements and let us estimate your needs.

IRON MOUNTAIN CO., 927-1001 East Ninety-fifth Street, Chicago

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DON'T OVERLOOK FIRST COST

ALTHOUGH the first cost of even the most expensive good motor truck is not an item of great importance when viewed in the proper light—as an investment whose earning capacity is spread over a long period of years—it is nevertheless sheer folly to pay more than is necessary for any machine, no matter what its claims to superiority, if equivalent and sometimes greater service can be obtained from a better but cheaper product. In the field of body equipment this fact is conspicuously true. The conventional type of mechanically operated dumping body is a highly complicated mechanism, high in first cost, high in selling price, and high in up-keep expense, and the very quality that makes its production cost unnecessarily high—its great and needless complexity of construction—is the quality that makes it undependable, liable to frequent service interruptions (for repairs that could be avoided by the use of a logically simple device), and a source of lasting grief to buyer and seller alike.

You remove one of the most serious obstacles to truck sale when you show the buyer a chance to escape unnecessary, but apparently unavoidable, expense, and at the same time you assure yourself of his everlasting good will by placing in his hands a product that carries no grief, that brings back no echoes, and that earns repeat orders through the simple and homely method of giving the maximum value for the minimum price. The following table shows the savings in first cost made possible by purchasing, in place of the complicated hydraulic type of dumping body, a unit of LEE design, LEE ingenuity, LEE simplicity, and LEE dependability. It gives, at the left, the total cost (except excise tax) of the old-fashioned equipment of standard design and, at the right, the comparative cost of LEE trouble-free equipment of the same capacity. The savings are substantial and can not be ignored by anyone interested in supplying the very highest type of dumping body and in guaranteeing the highest expression of operating economy.

Total Cost (excluding excise tax.)

Conventional, Complicated, Hydraulic Type.		Efficient, Simple, LEE Type.	
1-cubic yard body (10-gauge steel)	$200.00		
Hoist (light duty up to 1¼ ton)	175.00		
Installation charge	25.00		
Total cost	**$400.00**	1 to 1½-cubic yard body (10-gauge steel) complete, model 1BL(ight)	**$220.00**
2-cubic yard body (10-gauge steel)	$215.00		
Hoist (1 to 1½-ton)	220.00		
Installation charge	25.00		
Total cost	**$460.00**	1½ to 2-cubic yard body (10-gauge steel) complete, model 1½BL(ight)	**$245.00**
2-cubic yard body (8-gauge steel)	$265.00		
Hoist (2 to 2½-ton)	340.00		
Installation charge	50.00		
Total cost	**$655.00**	2 to 2½-cubic yard body (10-gauge steel) complete, model 2BL(ight)	**$270.00**
3-cubic yard body (8-gauge steel)	$289.00		
Hoist (2 to 2½-ton)	340.00		
Installation charge	50.00		
Total cost	**$679.00**	2 to 3-cubic yard body (8-gauge steel) complete, model 2BH(eavy)	**$375.00**
4-cubic yard body (8-gauge steel)	$313.00		
Hoist (3-ton or over)	375.00		
Installation charge	50.00		
Total cost	**$738.00**	3 to 4-cubic yard body (8-gauge steel) complete, model 3BH(eavy)	**$415.00**
		4 to 5-cubic yard body (8-gauge steel) complete, model 4BH(eavy)	**$450.00**

If you are not already familiar with the merits of LEE body equipment, note the features illustrated and itemized below and write for further information.

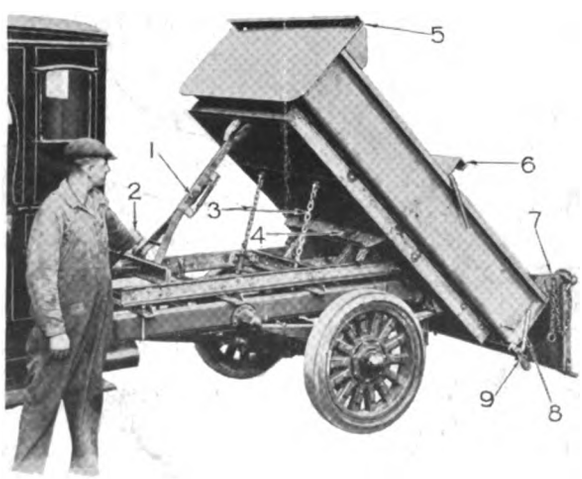
1 **Folding standard**—automatically locks body in dumping position.

2 **Control lever**—automatically locks body in traveling position.

3 **Check chains**—prevent malalignment of body on uneven ground.

4 **Roller segment**—rolls on a low track, giving low overall height.

5 **High dumping angle** moves the stickiest material quickly.



6 **Partition**—divides load for multiple batch hauling. ($20 to $25 extra).

7 **Spreader**—lays gravel, stone, etc., evenly and efficiently.

8 **Gate control**—affords automatic and manual operation.

9 **Lowest dumping point**—gives ample ground clearance.

LEE TRAILER & BODY CO.

2343 S. La Salle St. **Chicago, Illinois, U. S. A.**

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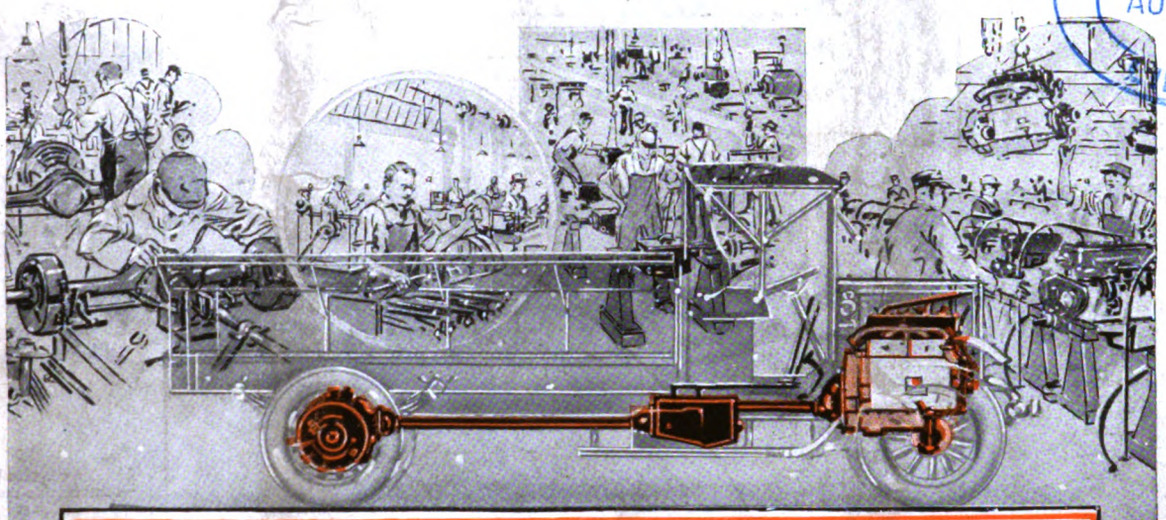
POWER WAGON

NUMBER 213 CHICAGO, AUGUST, 1922 Price 25 Cents

THE JOHN CRERAR LIBRARY AUG 8 1922



Back of the SPECIALIZED truck

Tests that no one organization could afford to conduct

The truck market today is peculiarly a buyer's market. Not only is the buyer in a position to be most exacting but *he knows how to be,* to a greater degree than ever before.

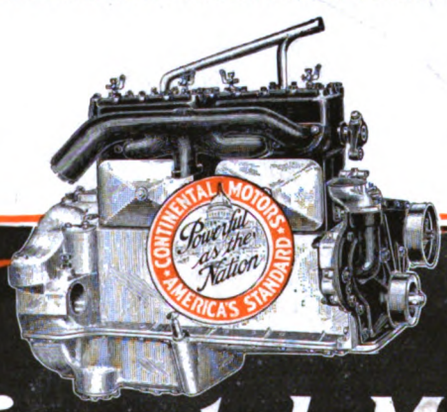
This explains the preference for the SPECIALIZED truck whose major units—motor, clutch, transmission, universal joints, axles—are *proven in production* by tests more detailed and exacting than any one manufacturer could afford to conduct.

Before the Continental Motor, for example, is delivered to the truck builder it is run for hours under the scrutiny of experts; is taken down and minutely examined; is reassembled and tested again. Careful production tests also insure the service of the genuine replacement parts that are sent to parts-distributing stations throughout the world.

Truck dealers who would be in a position to meet and profit by the requirements of today's exacting market are lining up with the SPECIALIZED truck, whose steady gain in favor follows the dependable performance of such proven units as the widely-known power unit—the Continental Red Seal.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, U. S. A.
Factories:
Detroit and Muskegon



Largest Exclusive Motor Manufacturers in the World

Continental Motors

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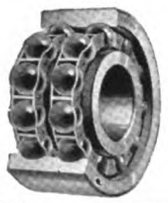


Double-row, maximum type, radial bearing

Double-acting, self-aligning thrust bearing. 2100 Series

Double-acting, self-aligning thrust bearing with leveling washers. 2100-U Series

Single-acting, self-aligning thrust bearing, leveling washer. 1100-U Series

Double-acting, thrust bearing, flat seats. 2100-F Series

Double-row, deep-groove Conrad type, radial bearing

Strom BEARINGS

Meet Every Ball Bearing Requirement

STROM BEARINGS are made for the purpose of giving maximum ball bearing service under the most exacting conditions. Every step in their manufacture is directed toward this end.

They are correctly designed, made of the highest grade materials, and heat-treated by the most modern and approved methods.

They are conscientiously manufactured in a wide range of types and sizes by expert workmen, and are rigidly inspected after every operation.

A staff of Strom engineers will be glad to give you the benefit of their experience in the selection of the type and size of bearing for your particular installation.

U. S. BALL BEARING MFG. CO.

(Conrad Patent Licensee)

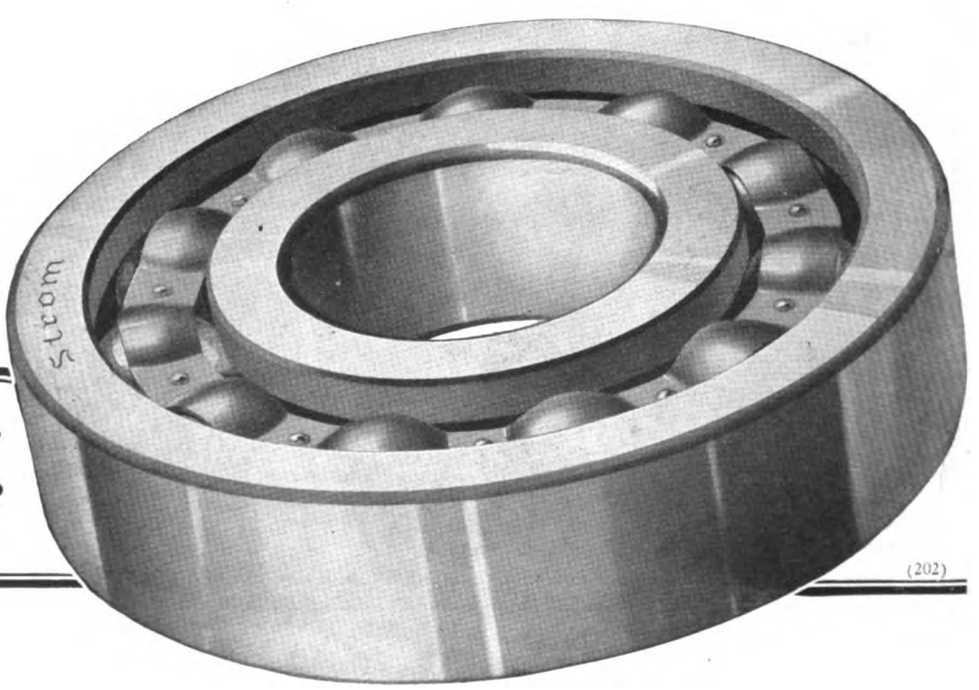
4500 *Palmer Street* CHICAGO, ILLINOIS

Single-row, deep-groove Conrad type, radial bearing

Angular contact bearing —combination radial and thrust

Single-row, maximum type, radial bearing

—used "Wherever a Shaft Turns"



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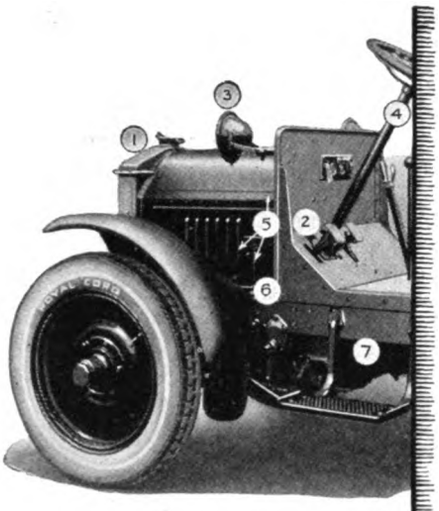
These Exclusive Features of the FEDERAL Fast Express



Establish Its Leadership in Light-Delivery Fields

To those who have known Federal performance in heavy-duty service, it is enough to say that this is *Another* FEDERAL—for hauling lesser loads at greater speeds.

As you study its exclusive features, note the exact adherence to standard truck-building practice in every detail. Nowhere do you find a passenger car part; nowhere do you find any compromise with the highest grade of truck construction.

This Fast Express materially enhances the value of the Federal franchise. Federal dealers can now supply a truck for any haulage need. There are a few desirable territories open—a wire or special delivery letter will have prompt consideration.

FEDERAL MOTOR TRUCK CO.
Detroit, U. S. A.

1 The Federal's Long Core Radiator, enclosed in heavy pressed steel shell with hundreds of long Fin tubes, insures ample cooling and greater strength. It is much stronger than the brittle cast shell and the thin steel passenger car types.

2 The steel dash and toe board insures strength and rigidity where these qualities are most essential. This assembly is tightly riveted and properly braced, and will not become loose or squeaky.

3 Electric lamps of generous size, with high candle power bulbs and refracting lenses, are mounted with adjustable brackets on the steel dash—out of the way of bumps and severe jars.

4 The Gemmer steering gear is of heavy truck duty, irreversible type, with worm and worm wheel. The bearings are extra large with ample adjustment for wear.

5 Such recognized units as Eisemann magneto ignition, Zenith carburetor and Stewart Vacuum System contribute materially to the superior efficiency and greater value of this Fast Express.

6 The Remy starting and lighting system insures better dependability at all times in these two essential features of truck operation.

7 The Borg & Beck clutch is of the dry disc type with large 10" facings. Engagement and release of these fabric discs is smooth and certain under all conditions.

1 Chrome Vanadium steel springs render the Fast Express practically immune from spring breakage. The superior strength and the possibility of greater distortion without setting of this analysis of steel over carbon steel springs is well known.

2 Timken Detroit rear axle with worm and worm wheel insures highest efficiency with the smallest loss of power through friction. It is more costly than either the internal or bevel gear type.

3 U. S. Royal Cord tires of unusually large size—33x5—are standard equipment.

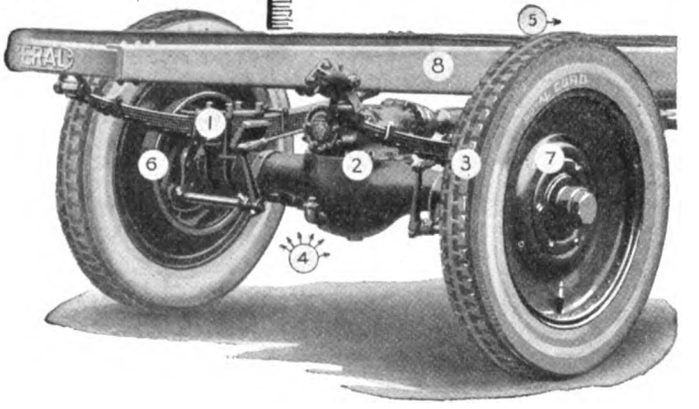
4 Alemite chassis lubrication insures proper lubrication of wearing surfaces at all times.

5 Exide heavy truck service battery with plates and separators of sufficient thickness to eliminate danger of buckling when under almost constant charging is infinitely superior to passenger car type batteries so frequently used for truck work.

6 The brakes are extra large: 15" in diameter with 2½" facings of asbestos fabric divided in four sections. Both emergency and foot brakes operate on the drums internally, but are easily accessible for adjustment.

7 Disteel wheels not only contribute materially to the appearance of the Federal Fast Express, but give added strength and resiliency. Both the wheels and the tires are demountable.

8 The frame is unusually strong. It is built of ¼" steel of great tensile strength and is 5" in depth and 3½" wide. Larger and stronger than any passenger car type, the Fast Express is built to withstand and support even unreasonable overloads.



Another FEDERAL

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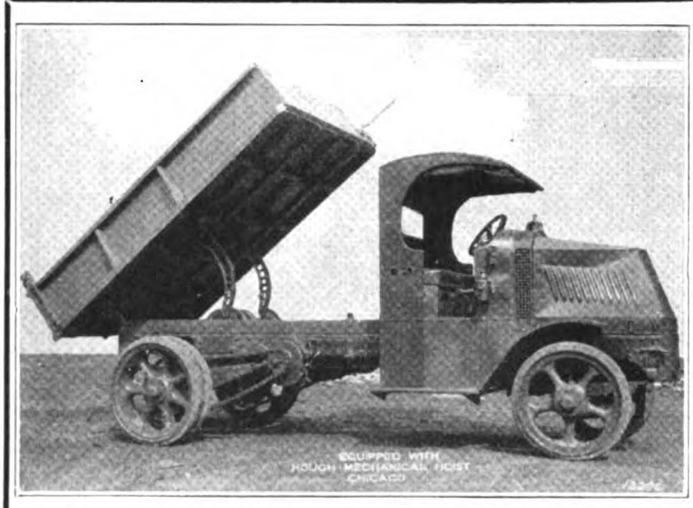
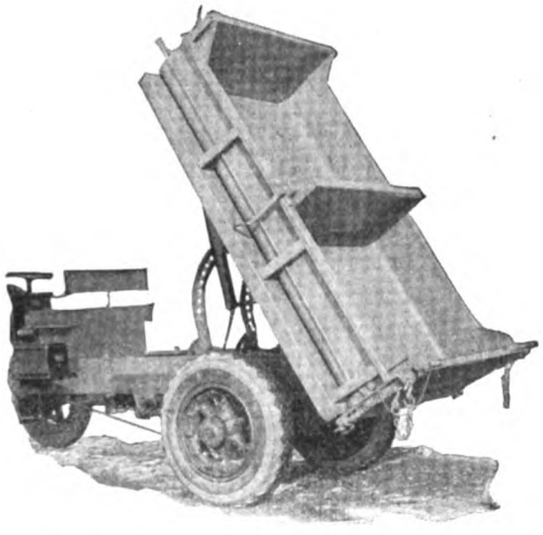


Hough Mechanical Hoist

installations become an integral part of your truck unit, carrying out the same principle of delivering the power of your motor in elevating the body through a positive gear drive identical with your own truck transmission. There being **no** oil cylinders, check valves or oil pumps. Nothing to be affected by dirt or grit, **no** valves to leak, **no** packing to become loose.

Hough Hoists boost everything but the repair man's profits.



The high dumping angle designed for road building units is an exclusive feature with Hough Hoists.

Built in three sizes, fits any make of truck.

3 Ton — 6 Ton — 10 Ton

WRITE FOR PARTICULARS

Hough Mechanical Hoist Co.

1900 Southpor Ave. Chicago

POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

Published monthly by

THE POWER WAGON PUBLISHING COMPANY

544 Lake Shore Drive, Chicago, U. S. A.

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THE POWER WAGON PUBLISHING COMPANY

WALTER WARDROP, *President and General Manager*
STANLEY A. PHILLIPS, *Vice-President and Editor*

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W. C. COFFEY, Eastern Representative

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INTERNATIONAL

Has a New Motor Truck Contract Featuring

Lower Prices! Bigger Business! Greater Profits!

Never before has the outlook been so good for the International Motor Truck dealer. In one great stroke his contract has been revised, his quality line *reduced in price,* and the terms made more favorable.

He now has a 2,000-lb. Speed Truck at $1250—a complete line of heavy-duty trucks up to 10,000 lbs. capacity—a special passenger bus chassis—haulage units for every prospect. He need turn none away.

Naturally such a favorable contract is popular. Yet there may be a vacancy in your territory that you can fill by acting quickly. Write, wire or phone for complete information on our NEW CONTRACT for 1923. It pays to sell Internationals—the "low-cost hauling" trucks.

INTERNATIONAL HARVESTER COMPANY
of America
Chicago *(Incorporated)* **U S A**

93 Branch Houses in the United States

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1897 **Autocar** 1922

Wherever there's a road

What a motor truck buyer wants to know

1 With whom he is personally dealing
2 Responsibility and experience of manufacturer
3 Trade in, rebuilding and reconditioning policy
4 Design and mechanical superiority
5 What size and weight truck he needs
6 What load he can legally carry
7 Insurance and license expense
8 Necessary gas and oil consumption
9 Cost of replacement parts
10 Assurance of immediate service

Because he wants continuous economical transportation

4 cylinder 4 to 6 ton Autocars

Wheelbase lengths	120 ins.	156 ins.
Maximum overall capacity (chassis, body and load)	22,000 lbs.	22,000 lbs.
Unladen chassis weights only	7200 lbs.	7400 lbs.
Prices (chassis)	$3950	$4100

4 cylinder 2 to 3 ton Autocars

Wheelbase lengths	114 ins.	138 ins.
Maximum overall capacity (chassis, body and load)	15,000 lbs.	15,000 lbs.
Unladen chassis weights only	5200 lbs.	5350 lbs.
Prices (chassis)	$2950	$3075

2 cylinder 1½-2 ton Autocars

Wheelbase lengths	97 ins.	120 ins.
Maximum overall capacity (chassis, body and load)	11,000 lbs.	11,000 lbs.
Unladen chassis weights only	3600 lbs.	3700 lbs.
Prices (chassis)	$1950	$2050

2 cylinder 1½-2 ton Autocars (Rebuilt)

Wheelbase lengths	97 ins.	120 ins.
Maximum overall capacity (chassis, body and load)	11,000 lbs.	11,000 lbs.
Unladen chassis weights only	3600 lbs.	3700 lbs.
Prices (chassis)	$1650	$1750

Prices F.O.B. Ardmore, Pa.

2 cylinder 1½-2 ton Autocars (Reconditioned)

Wheelbase lengths	97 ins.	120 ins.
Maximum overall capacity (chassis, body and load)	11,000 lbs.	11,000 lbs.
Unladen chassis weights only	3600 lbs.	3700 lbs.
Prices (chassis)	$1100 to $1400	

A motor truck is only as good as the service behind it

THE AUTOCAR COMPANY, Ardmore, Pa., (Established 1897)

The Autocar Sales and Service Company

New York	Boston	Philadelphia	Pittsburgh	Chicago	San Francisco
Brooklyn	Providence	Camden	Buffalo	St. Louis	Sacramento
Newark	Worcester	Chester	Baltimore	Dallas	Oakland
Schenectady	New Haven	Allentown	Washington	Los Angeles	Stockton
Syracuse	Springfield	Wilmington	Richmond	San Diego	Fresno
Fall River	New Bedford	Atlantic City	Atlanta		San José

Represented by Factory Branches in these "Autocar cities." Dealers in other places.

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POWER WAGON

Vol. XXIX. CHICAGO, AUGUST, 1922. No. 213.

June Is Industry's Largest Month in Motor Production

12 PER CENT. INCREASE OVER MAY

Additional proof of the nation's increasing need for motor transportation for both passengers and merchandise is supplied by the record-breaking figures, given out by Alfred Reeves, general manager, National Automobile Chamber of Commerce after a visit among the plants in the central west, which shows that in June the motor industry produced in excess of 288,000 motor vehicles, which is 12 per cent. greater than the previous record of 256,000 in May. This indicates a production for 1922 of more than 2,000,000 motor vehicles. During the second quarter of 1922 the entire industry produced 763,000 motor vehicles with 1,137,000 cars and trucks for the full six months.

"Reports received from 20 different sections of the country indicate the usual seasonal decrease," said Mr. Reeves, "which was expected a month ago. The slowing down for the next six months will be much less than usual, however, and the year's production will exceed 2,000,000 motor vehicles, as against 1,668,000 for 1921 and 2,205,197 the record figures of 1920.

"While the passenger-car end of the business supplied the biggest part of this increase, there has been a steady increase in the number of trucks made and sold, particularly those of the lighter type. The truck business depends on the improvement of general business and its need for increased transportation facilities.

"There is a broadening field for motor buses. In some cases they are being taken on as feeders for electric lines, while the enterprising railroad officials are now taking the truck as an ally of the main lines, with particular reference to short-haul business and store-door delivery.

"In January students of the industry predicted a substantial year for the motor car industry, based not alone on the need for motor cars that had not been satisfied last year, coupled with the fact that thousands of the ten million in use would wear out, but primarily because the manufacturers promptly took their inventory losses and priced their vehicles on a basis comparable with the buying power of the public. They advertised the reductions to the public and made their arrangements with the dealer and middlemen, so that the lower prices were passed on to the consumer.

"Coupled with the record-breaking production in June of 288,000 vehicles which was 61 per cent. over June 1921, there came an increasing demand from abroad. The government figures for May show that 6,798 cars were exported, or 6 per cent. increase over April. The motor truck exports were 1,203, or 36 per cent. better than April. Total motor exports were more than three times those of May, 1921. These cars and trucks were shipped to 60 or 70 different countries and indicate a revival of interest in motor transportation in those sections.

"On July 1 there were more than 10,500,000 motor vehicles registered in the United States."

More Army Material Available

The first shipment of surplus war material used by the American army of occupation in Germany and now to be distributed among the states for use in road construction arrived at Brooklyn July 1. The equipment, consisting of 30 trucks, 7 tractors, 4 concrete mixers, and 3 road-rollers, will be distributed by the Bureau of Public Roads of the United States Department of Agriculture in the same way as was several millions dollars' worth of material from France and the arsenals and camps in this country. Additional material for road-making to be shipped from Germany will consist of several hundred trucks, a number of tractors, and about 2,000,000 pounds of spare parts for trucks.

Goodrich Lowers Prices

The B. F. Goodrich Company has reduced the price of cord tires 10 per cent. and fabric tires 15 per cent. Truck tires are not included in the cut. The reduction follows within a week a cut of 28 per cent. by the Mason Tire & Rubber Company. Goodrich points out that tire prices are now 55 per cent. below the peak of 1920.

The company places the country's tire production for the present year at $500,000,000. Tire costs are now just about one-half of fuel costs. Production in Goodrich tire department continues to go up. The present production is 22,000 tires a day. All other Goodrich departments are very close to capacity.

Fuel Prices Reduced

Following the reduction of 50 cents a barrel in crude oil prices announced since July 15, the majority of the gasolene producers have cut the prices to the consumer from one to two cents a gallon. Sinclair, Standard Oil, Texas and others reduced almost simultaneously.

First Group of Associated Motor Industries Complete

EMBRACES FOURTEEN PLANTS IN ALL

Associated Motor Industries, the merger which has just been perfected by makers of seven different cars and trucks, has organized its central offices at Dayton, Ohio, and is pushing work rapidly ahead to get into full production. Nine manufacturing plants in seven states, with five assembling plants, fourteen in all, are included in this first group of Associated Motor Industries. Additional companies soon are to be taken into the merger, it is said.

Will I. Ohmer, of Dayton, Ohio, whose plant is one of the largest making ignition systems, is chairman of the board. He is recognized as one of the foremost production experts of this country.

Associated Motor Industries will continue to produce the cars and trucks at present made by the member companies, including Jackson cars and 4-wheel-drive trucks, the Dixie Flyer car and Old Hickory trucks, Traffic trucks, and the cars now made by the National Motor Car & Vehicle Corporation. In addition there will be a large surplus of parts and equipment that will be sold to outside manufacturers.

Standardized, large-quantity production will be put into effect. All the plants are fully equipped and capable of expansion in output. The dealers' financing plan of the Associated Motor Industries is an innovation in the distributing end, relieving the dealer of the burden of financing himself and providing a liberal sales outlet for the corporation.

Following are the manufacturers included in the first group of the Associated Motor Industries. Other manufacturers soon are to be taken in and their names are expected to be announced within a short time:

National Motor Car & Vehicle Corporation, Indianapolis—manufacturer of National cars.

Covert Gear Company, Lockport, New York—manufacturer of transmissions, clutches and controls for cars and trucks.

Recording & Computing Machines Company, Dayton, Ohio—manufacturer of ignition systems, magnetos, starters, battery systems and generators.

Jackson Motors Corporation, Jackson, Michigan—manufacturer of Jackson cars and trucks.

Kentucky Wagon Manufacturing Company, Louisville, Kentucky—manufacturer of the Dixie Flyer car, the Old Hickory

(*Continued on page 26.*)

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Dealers Evince Interest in Vehicle Selling Costs

NOVEL PLAN FOR USED CAR BUSINESS

Cost of operation is the item that motor dealers are giving more attention to at present than to any other, perhaps, outside immediate selling, according to information gathered by the National Automobile Dealers' Association representatives in investigations that now cover the entire country. Since March of this year every city of more than 50,000 population has been covered by representatives of the organization and dozens of cities of from 50,000 to 15,000 also have been visited. In each of these cities the leading dealers and distributers have been conferred with concerning future developments in the industry and their desires and suggestions will be used as the basis for adding to the business service program of the N. A. D. A.

The insurance service provided for members of the N. A. D. A. is being received by the dealers as a very definite asset, not alone from the viewpoint of the immediate results obtainable but as indicative of what can be accomplished by the high-grade motor vehicle merchants. It seems to be very clear that the dealers have actually taken up a study of costs for they are asking as to costs of various departments of the business in localities other than their own. How are salesmen generally being handled, and paid? Commissions or salaries, or both? How can better salesmen be obtained? What is the practice on finding and reporting prospects? What are the systems most in use? What are the developments in dealer advertising in various parts of the country? How do the dealers like the factory advertising campaigns? Will the factory advertising campaigns ever be improved? Are there any statistics or are there any widespread data available as to the cost of selling per vehicle? Are there any definite data possible on the average percentage of overhead? Has anything been worked out as to the definite departmentalizing of cost accounting? Can maintenance departments be made to show a profit, and how? What are some of the systems used to fix costs in the maintenance department? Will it become necessary in properly maintaining these transportation units to come to a 7-day 24-hour maintenance service?

The questions are almost innumerable. But one significant fact sticks out and that is that the used car which has been a very prominent subject in dealer discussion in the last two years has not continued to absorb all the discussion. It does come up and there are frequently questions as to how it is being handled. But these questions are directed in other directions. There seems to be considerable interest in the no-trade idea. There seems to be also one or two things being added to the long list of plans designed to be a panacea for the "used car problem."

One dealer has planned to allot to his salesmen a fixed amount of money which the salesman can use in making deals in which there is a trade-in. He has five salesmen. He will provide $2,500 for this used car purchase fund. Each salesman will have a maximum of $500 in this fund. The salesman can spend all of his $500 on trading one deal or he can spend it on five deals. But when he has reached his limit he can not trade any more until he has restored his trading credit by seeing to it that the used cars are sold. When the used cars are sold, the money from them is restored to the salesman's trading credit. The salesman may make one trade, allowing the full $500 on one job. If this job is sold for $400, the profit, commission of salesman and selling cost are deducted from that figure. Maybe it cost $50 to prepare the car and sell it, plus 5 per cent. commission ($20) and plus 20 per cent. commission for the house ($80), which make $150. The balance of $250 is returned to the credit rating of the salesman. He can now only tarde for $250 total. If he ultimately uses up his trading credit, he cannot make trades. If, on the other hand, the salesman has trade for a machine on which he allowed $400 and the selling cost, plus commission for salesmen and for the house, amounted to $150 and the job sold for $700, there is returned to the salesman's trading credit $550, which with the balance of $100 that was unused in the trade, gives him a total trading credit of $650. He has increased his own selling possibilities by increasing his own buying possibilities. The firm has profited and will profit more as the salesman builds up his trading credit. It puts the salesman in the position where the chief executive of the business has always been placed before, fixing the allowance, for the salesman loses instead of the house.

And there is the subject of financing time sales. The dealers say the finance company rates are almost prohibitive in view of money conditions, and that the rates are a source of sales resistance.

The subject of factory relations with dealers is not very prominent. Some dealers are complaining. It is not a high point of the dealer thinking, however.

June Motor Vehicle Output

Figures received by the Department of Commerce show a further increase in the June production of passenger cars and trucks. The total production of passenger-cars in June, so far reported, amounted to 261,963, compared to 231,724 in April. This is an increase of over 11 per cent. for the month. The total truck production in June was 25,912 machines, compared with the revised figures of 23,803 in May, an increase of 8.8 per cent.

With a few exceptions the following table represents the production of identical firms for each month including approximately 90 passenger-car and 80 truck manufacturers.

1922:	Trucks.	Passenger-cars.
January	9,344	81,693
February	13,121	109,170
March	19,651	152,959
April	22,227	197,221
May	23,803*	231,724*
June	25,912	261,963

*Revised.

Senate Will Investigate Fuel Price Maintenance

OIL PRODUCERS ASKED FOR DATA

Investigation into the oil industry authorized by a Senate resolution will be made by a sweeping inquiry into all conditions of the trade. The inquiry is under the direction of Senator LaFollette, chairman of the Committee on Manufactures, who, it is said, hopes to develop a situation that will bring about legal action and a lowering of gasolene prices.

As a preliminary step to the investigation, Senator LaFollette has sent questionnaires asking the producers and the dealers many important questions bearing upon the conditions of the crude oil and gasolene markets during the years 1920, 1921 and the first 6 months of 1922, as well as the reason for the changes in prices of oil and gasolene. Other questions asked cover organization and business and financial conditions.

In this connection, Senator LaFollette said:

"These schedules are framed with the view of getting from the companies the latest and most complete information on the subject covered by the resolution. The purpose of the schedule on prices is to determine the prices paid by refineries for the crude oil or raw materials and the prices revised by them for the finished products resulting therefrom after the refinery operations. Its purpose is also to bring out the tank-wagon prices of gasolene and kerosene and the differentials existing between said prices and the retail or service station prices.

"The schedule on organization and business is intended to develop the intercorporate relations, if any, existing between the various companies engaged in the oil business; also to develop any common stock ownership that might exist together with any strong connection existing by virtue of any financial relationship.

"The financial schedule is intended to develop the financial condition of the companies in the various branches of the oil business during the period mentioned, also to bring out the profits made in the industry during this period.

"These questionnaires were sent to something over 350 companies, covering all the large refineries and producing companies and the principal marketing companies. The questionnaires were accompanied by a copy of the resolution and a letter of explanation, so that the companies might be fully informed respecting the scope and purpose of the investigation."

Show Dates Set

Dates for the two National Automobile Shows have been decided upon by the National Automobile Chamber of Commerce as follows:

New York, January 6 to 13, at the Grand Central Palace.

Chicago, January 27 to February 3, at the Coliseum, and the First Regiment Armory.

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Milk Producers See Relief in Motor Truck Transport

RAILWAY RATES ARE STILL TOO HIGH

Employment of motor trucks in the transportation of milk on short-line hauls from the "milk sheds" to large cities will be undertaken at once, according to an announcement made by Charles Holman, executive secretary of the National Milk Producers' Association, composed of twenty-six allied associations having more than 200,000 members. Because of the excessive rates on milk and cream, which are now being transported by the railways, and to which the recent reduction of rates does not apply, the milk producers must perforce turn to some other source of transportation, and the truck, the association believes, offers the solution.

So convinced is the association that it will be necessary to resort to truck transportation that it has asked the National Automobile Chamber of Commerce to submit proposals and data on the best method of solving the problem of the 200,000 milk producers, members of the association. The problem has been put before the manufacturers and will be worked out by the Motor Truck Committee of the N. A. C. C., of which F. W. Fenn is secretary.

Pending the survey of the situation, which will be made by the N. A. C. C., the milk producers are bending their efforts to have the Interstate Commerce Commission issue an order permitting them lower rates on the transportation of their product. Because of the fact, however, that all milk and cream is transported by passenger and express trains. little hope is entertained by the milk producers for a reduction in their rates.

Chief among the problems submitted to the N. A. C. C. by the milk federation is whether or not it would be more economical for the association to operate its milk trucks, running them in fleets, or whether or not it would best serve its interest to organize a holding company, the stock to be sold to the milk producers, which would handle all short-haul milk for the association members.

"Figures secured by our organization indicate that we can transport our product, on short hauls, considerably cheaper than is being done by the railroads, because, when shipping by truck, we save a delivery charge to the railroads and also a delivery charge from the railroads to the distributing stations," Mr. Holman said in discussing the situation. "We have about given up hopes of securing a reduction on milk rates from the I. C. C. Our only recourse would seem to be the employment of individual trucks or the use of a comprehensive transportation system serving our members in each of the important and large cities."

The N. A. C. C. Truck Committee has been asked to submit figures showing the relative cost of automotive transportation over dirt road as compared to approved highways.

"General adoption of automotive transportation by our association would be a decided factor in the motor truck business of the nation, because of the number of trucks that would be required and the fact that ours would be the first large association to adopt on a national scale, we believe, the use of motor transports in fleets for the transportation of our product," Mr. Holman said.

This saving, however, it develops, diminishes when the haul is above 40 miles and totally disappears when the haul is in excess of 60 miles. With the milk producers the question of transportation of their product has been a succession of rate increases until, at the present time, the Interstate Commerce Commission was informed when appealed to for a reduction, "the parting of the way is near" unless some relief is afforded the milk producers at once. "As the matter really stands today," Mr. Holman said, 'the milk producers simply are forced to turn from the railroads to trucks, and what we have really done has been to invite the motor industry to assist us in our problem, which I believe will redound to the interest of both the automobile industry and the 200,000 members of our twenty-six allied associations."

Seeks 'Bus Owner Bonds

The Nebraska railway commission is endeavoring to get names of all motor 'bus owners in the state with a view of forcing them to appear before the commission and show cause why they should not put up a bond sufficient in size to guarantee at least $5,000 liability on every passenger carried. The commission holds it has power under existing laws to force such action from owners of 'bus lines in Nebraska.

Stephenson President of Indiana

Following the recent death of Mr. Barley, former president of the Indiana Truck Corporation, of Marion, Indiana, J. W. Stephenson, the company's vice-president and general manager, was elected to the presidency. Mr. Stephenson is a large stockholder in the company and has held executive positions for a number of years as treasurer, vice-president, and general manager.

Parts Sales to Date

The following table shows the sales by members of the Motor and Accessory Manufacturers' Association, the total of past due accounts and the total of notes held for all the months of 1921 and the first five months of 1922:

1921.	Total Sales.	Per Cent. Change.	Total Past Due.	Per Cent. Change.	Total Notes Outstanding.	Per Cent. Change.
January	$6,264,587	.....	$8,099,727	.....	$4,359,871	.....
February	10.408,962	66.15 Inc.	6,717,165	17.07 Dec.	6.063,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26 746,580	32.93 Inc.	5 352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781.350	.13 Inc.	4.505.176	15.64 Dec.	4,460,355	16.77 Dec.
June	22.703.414	15.19 Dec.	4,720.973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348.790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	5,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3.463,500	5.82 Dec.
November	18.998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922.						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22.720.000	31.17 Inc.	4.070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2.890.000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830.000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.5 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.5 Dec.

Bureau of Mines May Show Way to Gasolene Economy

CHECKING FUEL-YARD TRUCKS' WORK

Preliminary reports on efficiency tests, now being conducted by the government Bureau of Mines, show, after a course of experiments in the adjustment of carbureters on government operated vehicles, a saving of 25 per cent. in the consumption of gasolene. The tests now being conducted are made on motor trucks used for hauling coal from the government fuel yard, the trucks being in operation for 8 hours a day, under ordinary city use. The tests, under the supervision of G. W. Jones, assistant explosive chemist, disclose the fact that practically all the 40 vehicles tested were using a mixture too rich in gasolene.

Before the adjustments, the exhaust gas was found to run 5.8 to 12.3 per cent. carbon dioxide. All machines were adjusted to give 11 to 12 per cent. carbon doxide at a speed of 5 miles per hour, the usual speed for the trucks. On level grades the carbon dioxide dropped about 1 per cent. under that on up-grade.

A complete record of the test is being kept by the government on each of the forty 5 and 7½-ton trucks, and the results of recommendations of the department will be made the basis of a brochure to the automotive industry, with the result, it is expected, that the government will be able to point the way for a very material saving in gasolene consumption.

The volume of gasolene consumption is considered to have been effected by three factors, 33 per cent. due to the machine, 33 per cent. to the carbureter adjustment, and 33 per cent. to the driver.

GMC Business Good

The best June in the history of the plant and one of half a dozen leading months at any season, says Sales Manager Vance H. Day, of June's General Motor Truck Company's business. Prospects for July he declared to be very good, although there was a tendency toward a lull in orders during the first week in July. Special activity among agents offset this, however. August, September and October are likely to be record-breakers in truck business, Mr. Day says. Increased business on heavier models indicates that industrial concerns are back in the market for trucks.

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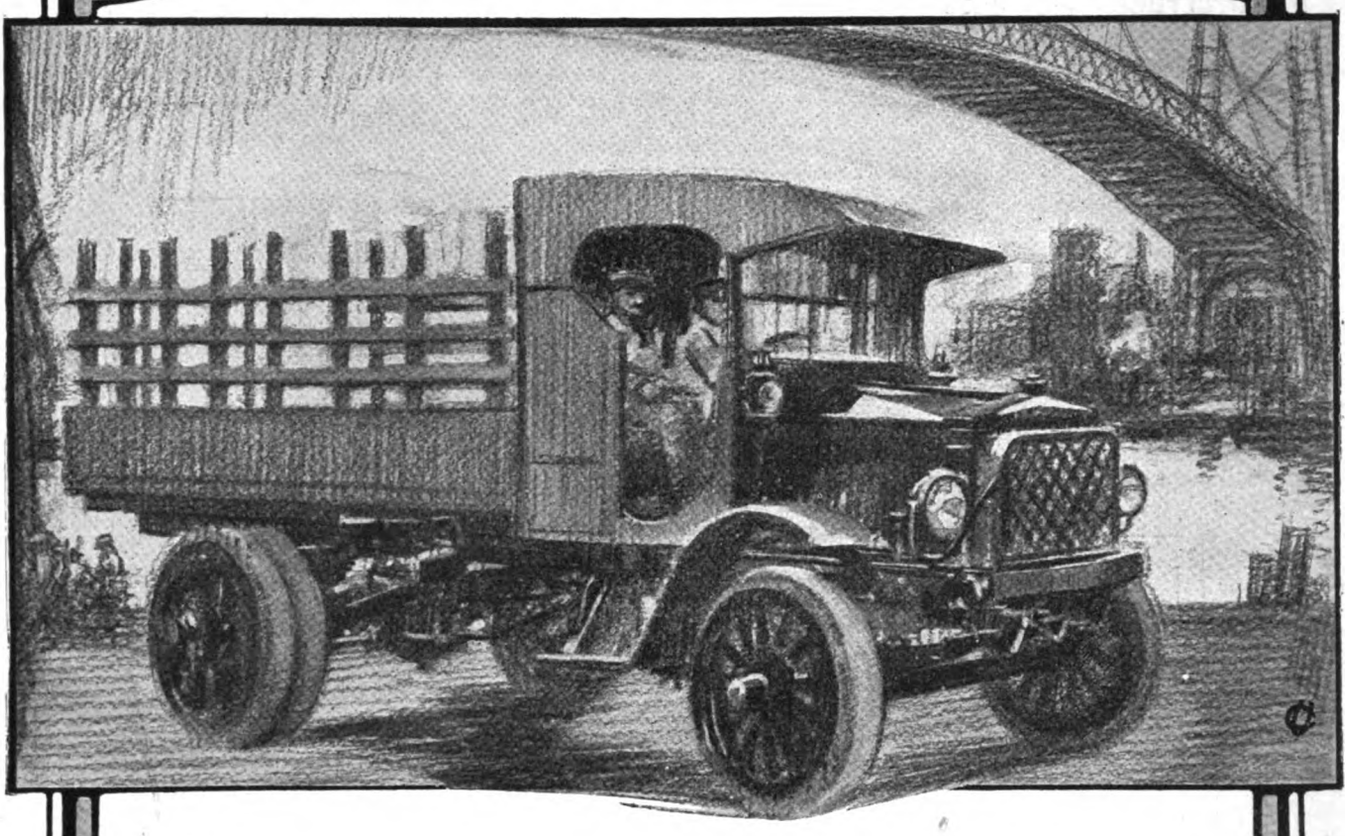

Why American-LaFrance Commercial Trucks Must Be Good

At the recent Million Dollar Fire in Norfolk, Va., an American-LaFrance Fire Truck pumped water for 75 continuous hours. This put a strain on the motor equal to running three days at top speed. At the end of the task the car was in perfect condition.

American-LaFrance Commercial Trucks will be operated by power plants of similar design, built by the same engineers. They can be counted upon to give the uninterrupted day-in and day-out service essential to low hauling costs.

AMERICAN-LAFRANCE FIRE ENGINE COMPANY, INC.

FACTORY BLOOMFIELD, N. J. ELMIRA, N. Y. *NEW YORK OFFICE* 250 WEST 57th ST.

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

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New York Office, 51 East Forty-second Street.

Investment in Peril

WHENEVER the conservative advocate of greater centralization in industry raises his voice in protest against the reckless multiplication of makers and distributers, the commercial adventurer, the small-scale *entrepreneur,* the clerk-become-capitalist, cries loudly for recognition of the rights of individualism and, calling heaven to witness, proclaims the impending collapse of republican institutions. To attack the misapplication of capital, to condemn the excessive growth in the forms of capital which an unrestricted duplication of productive and distributive processes necessarily entails, is to invite the stigma of radicalism and to earn the suspicious regard of the commercially ambitious but industrially superfluous. To suggest consideration for the larger interest at the expense of the smaller is to be guilty of the rankest socialism, say the exponents of the promiscuity idea. And so is sanity mistaken for imbecility.

The economics of the situation ought to be pretty plain to anyone capable of straight thinking. If there are nearly three hundred makers of trucks in this country where twenty would suffice, the superfluous 280 could be destroyed without in any degree diminishing the amount of real capital in the motor truck industry. If some great catastrophe should overtake the 280 and wipe them out of existence, although the owners of those plants would sustain a loss, that loss, expressed in money terms, would be offset by a rise in the money value of the remaining 20. The consumption of motor trucks is the factor that governs the quantity of real capital engaged in truck making, so that, if 20 factories are able to provide the necessary supply of motor trucks, the value of the existent 300 plants is no greater than that of 20. That is to say, assuming that the business of the truck industry were equally distributed among the 300 plants, the real capital of the industry would be thinly spread over 300 factories, which could be employed only part time without glutting the market, instead of being concentrated on 20 factories producing on a basis nearer full capacity.

If 20 truck plants can (as they did last year, for example) manufacture approximately 80 per cent. of the entire industry's output without utilizing, on the average, more than 50 per cent. of their available plant capacity, it is pretty evident that they could easily have taken care of the remaining 20 per cent. without in any way straining their facilities. Under such circumstances there can be no economic justification whatever for the existence of the 280 plants whose combined output was but a fifth of the industry's total. Similarly, this 20 per cent. portion of the total, had it been distributed among the 20 plants instead of being spread out among 280, would have increased the real capital value of those 20 factories instead of diminishing it. In either case the value of the industry, expressed in terms of real capital, would have been the same. But, because 20 per cent. of the trade's total output was thinly spread out among 280 makers, the capital investment of the 20 was needlessly imperiled and their profitable operation made, in many cases, an utter impossibility.

Since the real capital value of an industry is determined by the consuming capacity of its customers, the capital value of each producing unit is dependent on the number of units engaged, and the greater the number of these producing units, the lesser must be the capital value of each on the average. The advent of every newcomer, in spite of the fact that he brings fresh capital to the business, does not, under the circumstances described, add one whit to the real capital value of the industry; on the contrary he diminishes the capital value of every established concern in the business, makes its investment less secure, its operations more perilous, and its future more uncertain. The disappearance of every superfluous producing unit enhances the capital value of those that remain by reducing the amount and severity of competition and by diminishing the wastefulness of duplicated effort.

This, in brief, is the economic view of the situation that confronts the motor truck industry on the producing side, and a similar picture could be drawn of distribution, where less than half of the dealers engaged sell four-fifths of the industry's total output, and of parts manufacture, where a few producers supply the bulk of the units used in truck assembly. In all its branches the truck industry exhibits a striking example of the manner in which capital investment is imperiled and profit-taking rendered uncertain through the needless and reckless multiplication of producing and distributing factors. It exhibits incontrovertible evidence of the wastefulness and falsity of the theory that an industry can be indefinitely expanded and enriched by the unrestricted exercise of individual initiative and effort.

An Era of Mergers

PERIODS of business depression and those immediately following them provide fertile soil for the merger idea, the evils of overproduction and overexpansion becoming particularly acute and conspicuous when demand falls below the expectations of producers. In the motor truck industry these evils have been especially virulent, attacking every branch of the trade and bringing about all the irritations to which an inflated business must necessarily be subjected. In this case, however, with a few notable exceptions, relief has not been sought in merger, although, in many ways, combination offers a rather direct route to safety when properly managed, and some satisfac-

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tion may be derived from this fact, since mergers, rashly conceived and effected without due regard to the industrial need for consolidation, have a greater capacity for harm than for good.

When Arthur Reynolds, the Chicago banker, recently said that "it is more generally recognized that there is real economic gain in consolidations," he neglected to emphasize the difference that must be drawn between the merger of sound origin and sane program and the one conceived without regard to industrial welfare as a whole. Bankers are often tempted to applaud mergers without inquiring into the need or justification for them in an industrial sense; it is enough that the consolidation offers a plan for retiring bank loans concerning which the bankers have become uneasy; it is no affair of theirs, say they, if the projected merger shall render more precarious the existence of other members of the industry or add to the already onerous difficulties of the trade.

Happily, the truck industry has managed to keep itself free from the type of merger that increases rather than diminishes the confusion and clutter of competition. A consolidation that seeks to keep alive the waifs of commerce through the infusion of new capital into quite exhausted enterprises must be looked upon as an obstacle to industrial progress. On the other hand, one which seeks to stabilize conditions by a reduction of the duplication and lost motion incident to multifold productive and distributive processes marks a distinct advance and deserves the support of industry at large. Nothing more wholesome could overtake this trade than a general movement toward the elimination of unsound factors through consolidation and a general simplification of production and distribution, and there is, perhaps, no surer method of attaining that end rapidly than through safe, sane and effective combination.

Motor Truck Shows

ANNOUNCEMENT of the dates of the forthcoming motor car shows has revived interest in the question of truck shows and sentiment in the producing and selling branches of the industry appears to be divided in about the same way as during recent years. There is no general denial of the value of truck shows but, instead, a complaint of the low receipts which fail to balance the expenditures. It is to be feared that such a situation is common to most industrial exhibitions, whose purpose is not to effect sales but to advance industry.

One point in favor of truck shows that has commonly been overlooked is their unequalled value as defenders of the solid fabric of industry. Instead of affording a "starting point for new firms," as an English contemporary points out in lamenting the absence of a truck exhibit this year, truck shows provide an unparalleled opportunity to focus public attention on the worth-while factors of the industry, at the same time discrediting unstable and irresponsible manufacture by the very simple and effective method of keeping it buried. If truck shows have the effect, as the journal referred to believes, of bringing "fresh blood" into the industry, we should be most heartily against them, for there is no place for new blood of any kind—either good or bad—in a business that already suffers from the prostrating effects of high blood-pressure. Truck shows will prove of greater value in venesection than in intrafusion, and it is quite possible that their usefulness in this direction will more than outweigh what is considered to be their unwarrantably high cost. As sellers of product shows are never likely to take high rank, but as silent defenders of industry, as indicia of stability and dependability in business, we suspect they have no equal.

Will Study Road Resistance

Initial results secured from an investigation of the tractive resistance of roads indicate that information will be secured of great value to the highway engineer and the user of motor transport. The investigations are being carried on under the auspices of the Advisory Board on Highway Research of the National Research Council with which the Bureau of Public Roads, United States Department of Agriculture, and the Quartermaster Corps, United States Army, are coöperating.

One phase of the investigation shows that there is a great difference in the power required of the engine when a truck is traveling over different types of surfacing, the amount being more than twice as great on some of the lower types when compared with that on higher types. It is also shown that the power required to overcome the road resistance is not proportional to the speed of the vehicle and after a certain speed is reached increases very rapidly.

The investigation when complete will cover tests with various types of motor vehicles with the load, tire, and spring equipment varied on different types of surfacing and at varying speeds. The data will include gasolene consumption, internal engine resistance, wind resistance, and road-surface resistance. When carefully analyzed it will aid the highway engineer in determining under a given set of conditions what type of surface should be built for a given volume of traffic to result in the least total cost for road and vehicle operation. The same sort of study will be made as to expenditures for grade reduction to reduce operating costs.

The truck operator will be given valuable information on the effect of tire and spring equipment, lubrication, size of load and speed of vehicle on fuel consumption which should aid him in producing cheaper transportation.

Tires by Motor Trucks

Fleets of motor trucks will insure America a sufficient supply of tires, if the railroads are tied up by strikes. The tire industry itself has sufficient trucks to insure adequate distribution of tires. In previous difficulties it has been possible to hire enough trucks to bring in the raw materials. Inventories are sufficiently high to make unnecessary much hauling of materials. Coal supplies insure against a fuel famine, and mines near Akron can provide additional fuel.

Rubber Surface for Roads

Experiments are now being conducted by the Colombo (Ceylon) municipality in the use of rubber as a road-surfacing dressing. The solution used is made from pure bark and scrap rubber and is the invention of a Ceylon planter. It is put on in liquid form. The experiments, conducted on one of the most used of Ceylon's thoroughfares, proves the material much easier to handle than tar. Heretofore the idea of using rubber was confined to blocks of the material which proved too expensive. The liquid dressing is expected to last twice as long as the tar preparations and, while costing from 50 to 75 per cent. more, is expected to balance this by lowered labor costs.

'Bus Terminal Opened

A union 'bus depot has been opened in St. Paul at 136 East Sixth Street. Cars operate at forty-two points in the vicinity of the city. The station is operated by the St. Paul Bus Depot Association. 'Bus lines which start cars from this depot are the Gopher Transportation Company to St. Croix Falls, Wisconsin, and intermediate points; Inter City 'Bus Line to Stillwater; Twin City Motor 'Bus Company to Bald Eagle Lake; Mohawk Stage Line, Inc., to Ellsworth, Wisconsin; Touring 'Bus Company to Rochester, Minnesota; Terminal Motor 'Bus Company to St. Paul Park. H. L. Bollum is president of the association and M. J. David is secretary.

The Public Service Commission of Pennsylvania has granted 44 permits to truck haulers and 'bus operators, many for western Pennsylvania 'bus routes, including a number in Pittsburgh.

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Pirate Parts Situation Is Reviewed by Hutchinson

LEGAL COMPETITION HARD TO MEET

O. C. Hutchinson, chairman of a special committee to investigate the Pirate Parts Situation, read the following report at the recent members' meeting of the National Automobile Chamber of Commerce:

"Pirate parts as here discussed will include not only such as are so defined by law, that is, those which infringe patents or are misrepresented as the genuine, but all those substitute or replacement parts that are not like the original used by the manufacturer or authorized by him. A better name would be unauthorized parts. These may be divided into three classes: (1) Strictly pirate parts; (2) Low-grade unauthorized parts; (3) High-grade unauthorized parts.

"Competition from unauthorized parts of all kinds is a disadvantage to the industry, but, only when it is also a disadvantage to the user, can we reasonably expect sympathy and coöperation from the trade and public in antagonizing such traffic. All Class 1 and 2 parts, it can be shown, are against the owner's best interest, so that educating the public to this fact will accomplish much. Further the unfair competition of Class 1 (pirate) parts can be restrained by law. This class, however, does not present the most serious menace nor does it represent the largest volume.

"The unauthorized parts that are not pirates, Classes 2 and 3, are the hardest to contend against because trade in them is not illegal; it is more difficult to show the public the disadvantage of using them, and our dealers are the worst offenders in buying them. It is this competition that needs the manufacturers' closest study.

"Dealers claim they would not use Class 2 parts—those that are inferior yet not pirates—if manufacturers priced parts right and had adequate distribution. It is largely a matter of educating the dealer to the importance of coöperation with the factory for his own protection. Many factories have used bulletins and letters to their dealers to explain to them the importance of adhering to the use of those parts that the factory has found to give the best service in their particular product and to warn owners against the use, or allowance of the use of any but original parts, because of its invalidating the guarantee.

"Class 3 parts include those that are equal or superior to the original. If, in addition, the latter are sold for less than the genuine, the owner is bound to consider it to his advantage to use them, and it would seem to be the vehicle manufacturer's place to strive to learn how to equal their quality and meet their price. When it is to the public's interest to use such parts, it is almost fruitless for manufacturers to put forth effort and advertising expense against them, or seek to dissuade dealers and owners from using them.

"The strongest competition comes from such of Class 3 parts as may be regarded as equal to the original but cheaper in price. The producer generally has less overhead because he concentrates on parts that are most in demand, whereas the vehicle manufacturer has to carry all parts that may be wanted and so, having many slow moving parts, has a larger overhead. It is this competition that is hardest to meet. There may be some parts that could be priced closer, if the manufacturer realized the importance of studying ways to reduce the cost so that this outside competition might not get a chance to start.

"The independent repair shops and garages afford the greatest market for unauthorized parts. If a more attractive price is offered than can be obtained by buying from the factory's distributer or dealer, naturally the repair man turns to the cheapest source, feeling less concern about the reputation of the vehicle than the authorized dealer or the factory. To meet this situation there have been very earnest representations from individuals and organizations that it is highly important for the factories to enable dealers to give material discounts on parts to independent repair men.

"Among the most recent of the latter was a resolution passed by the Los Angeles Trade Association and transmitted to the chamber by the California Automobile Trade Association, declaring that most automobile manufacturers allow so little discount on repair parts that local distributors and dealers can not give a discount to legitimate repair men, driving the repair men to purchase imitation or pirate parts to the ultimate harm of the motor vehicle manufacturers. In his letter accompanying the resolution, Secretary Robert W. Martland gave it as his opinion, that, 'unless a discount on standard manufactured parts is given to legitimate repair men, the pirate companies will control the situation in California.'

"About the same time the Intermountain Automotive Trade Association of Denver circularized the manufacturers, declaring that the only way to eliminate the pirate parts evil is for them to allow a greater discount to distributers so that they in turn can give independent repair shops a fair discount.

"Some doubt the efficacy of this as a remedy, believing that, instead, it will aggravate the disease. Assuming that the manufacturer has priced his parts as low as possible in the beginning, he must raise his list prices in order to give the distributer a larger discount, which will have the effect of increasing the cost of parts to the owners, tending to drive them to the pirate part market.

"When the manufacture has made his parts prices right, distribution right and his discounts right, the rest of the job is education. This must reach the dealer, the owner and the independent repair men, or the public in general, and tell why the manufacturer knows best what parts should go into his truck, why he should be able to turn out the best in quality for a given price, and why the use of an inferior part may be dangerous or at best expensive and uneconomical.

"The chamber's attorney, Charles Thaddeus Terry, says protection is only possible if manufacturers plainly mark every part likely to be pirated with a copyrighted identifying mark and warn against the use of all others."

Truck Production 11½% of Passenger-Car Output

WAS NEARLY 20% IN "BOOM" YEARS

"The relation of motor truck output to passenger-car production has varied widely in the past ten years and illustrates the fact that the showings of truck makers do not necessarily reflect the prosperity or ill fortune of passenger-car producers," says the *Wall Street Journal*. "The current situation is typical. Passenger-car companies, almost without exception, are enjoying good business and returning large profits. Most motor truck manufacturers are experiencing little demand and barely earning operating expenses, although well-established and well-financed concerns are doing well.

"In the first five months this year the aggregate output of motor trucks approximated 89,000, equivalent to about 11½ per cent. of the total passenger-car output of 861,700 for the same period. Last year the total truck production of 154,500 was about 10 per cent. of the 1,514,000 passenger vehicles turned out. In 1918 truck production was 24 per cent. of passenger-car manufacture, the highest ratio on record and due to the abnormal demands created by the war, and in 1913 and 1914 it was 5 per cent.

"The following tabulation shows motor truck and passenger-car production since 1912 (N. A. C. C. figures), with percentage of truck to passenger-car output:

	Truck.	Passenger.	Relation of Truck to Pass. Car.
*1922	89,000	861,700	11½%
1921	154,550	1,514,000	10
1920	322,039	1,883,158	17
1919	316,364	1,657,652	19
1918	227,250	926,388	24
1917	128,757	1,740,792	8
1916	90,000	1,493,617	6
1915	74,000	818,618	9
1914	25,375	543,679	5
1913	23,500	461,500	5
1912	22,000	356,000	6

*First five months.

"A curious feature of the automotive industry lies in the fact that there are approximately 230 active motor truck manufacturers in the United States against 177 passenger-car companies. A dozen companies probably account for well over 80 per cent. of the total truck output. At the beginning of 1920 there were nearly 270 truck manufacturers, against less than 140 passenger-car producers. There are indications that within five years the number of truck companies will be still further reduced, which should result in strengthening the industry as a whole."

London has 1,600 safety traffic zones, reports Inspector Edward H. May, chief of the Division of Traffic, Cleveland Police Department. Inspector May believes that the London custom of having street-cars stop on the near side of the street, a practice observed in many American cities also, is helpful to traffic.

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Fewer Stolen Motor Cars Recovered in Last Year

THEFTS KEEP PACE WITH PRODUCTION

Motor vehicle thefts seem to keep pace with motor production, according to statistics of 28 "index" cities for which complete four-year figures have been kept by the National Automobile Dealers' Association. These 28 cities show that 37,554 motor vehicles were stolen in 1921 and 21,273 recovered. The number unrecovered was 40 per cent. of the total, the highest noted in the four years, indicating that the thieves not only are keeping abreast of the production but forging ahead of the police departments and the legislative bodies in means devised to safeguard the owner. A summary of the four-year figures for the 28 cities follows:

	1918.	1919.	1920.	1921.
Stolen	27,445	33,508	30,046	37,554
Recovered	21,673	24,740	21,273	26,517
Unrecovered	21%	26%	29%	40%

New York again heads the list with total number stolen, 6,808. Chicago is a close second with 6,799. Chicago recoveries, 4,438, however, were greatly in excess of the recoveries in New York, 3,451. Twenty-one cities showed a greater number stolen in 1921 than in 1920. Cleveland, Portland (Oregon), Seattle, Salt Lake City, Columbus (Ohio), York (Pennsylvania), and Richmond (Virginia) showed fewer thefts in 1921 than in 1920.

"The greatest handicap under which the police are laboring in the recovery of stolen vehicles," according to C. A. Vane, general manager of the association, "is lax enforcement of laws to punish motor vehicle thieves. Courts are unduly lenient with this class of offenders. Charges are continued against such law-breakers until the patience of the witnesses is exhausted, finally resulting in dismissals and nolle prosequis."

A tendency was also noted during the 1921 depression for owners of insured vehicles to conspire for the disappearance of the vehicles in order to collect the insurance. Numerous cities over the country reported the recovery of motor cars from quarries, pits and rivers that had been reported stolen and which the police declare were clearly disposed of with the connivance of the owner."

The detailed 4-year record for the 28 cities follows:

MOTOR VEHICLES.

	Stolen				Recovered			
	1918.	1919.	1920.	1921.	1918.	1919.	1920.	1921.
New York	3,340	5,527	5,179	6,808	2,578	3,124	2,717	3,451
Chicago	2,611	4,447	5,974	6,799	1,954	3,447	4,340	4,438
Detroit	2,639	3,481	3,300	3,732	1,934	2,529	2,563	2,410
Cleveland	2,076	2,338	2,649	2,304	1,816	1,786	1,765	1,532
Los Angeles	1,629	1,688	1,654	2,333	1,499	1,365	1,152	1,725
Kansas City	1,144	1,661	801	1,577	606	794	341	1,153
Portland (Ore.)	1,088	1528	465	338	990	1,378	418	303
Denver	901	1,440	858	1,862	627	1,187	651	1,711
San Francisco	1,122	1,354	1,186	1,652	1,082	1,304	1,156	1,608
St. Louis	2,241	1,241	788	1,560	1,354	944	641	1,247
Seattle	1,451	1,422	1,008	861	1,376	1,398	900	710
Indianapolis	404	1,031	1,152	1,238	334	692	833	979
Boston	866	1,002	480	490	607	580	297	216
Salt Lake City	797	776	592	516	790	758	555	482
Oakland	895	760	564	729	860	733	549	680
Omaha	1,039	734	634	927	669	567	507	855
Columbus (Ohio)	451	550	513	408	352	373	278	355
Cincinnati	348	520	525	741	291	293	273	445
Oklahoma City	571	149	205	493	484	70	133	396
Albany (N. Y.)	41	133	87	234	29	104	70	177
Buffalo	1,262	986	743	1,152	914	700	507	928
Newport	4	9	12	14	4	9	12	14
York (Pa.)	6	10	8	2	6	9	8	2
Grand Rapids	152	189	262	267	149	137	250	207
Richmond (Va.)	84	207	148	130	62	161	93	100
Dayton (Ohio)	207	228	198	227	241	213	217	243
Lowell	26	25	18	36	16	17	7	31
Evansville (Ind.)	50	72	43	124	49	68	40	119
Totals	27,445	33,508	30,046	37,554	21,673	24,740	21,273	26,517

White Quarter 40% Better

The White Motor Company truck sales for the second quarter of the year show an increase of 40 per cent. over the first quarter and 23 per cent. over the second quarter of 1921. The month of June was the best since September of 1920.

Orders continue to reflect the generally improved business conditions, the second quarter showing an increase of 26 per cent. over the first quarter and 37 per cent. over the corresponding quarter of last year. Cash on hand is $2,500,000, with notes payable reduced to $1,200,000 and no customers' paper discounted.

Inventories are now at a minimum and the production schedule is being gradually increased to meet current demands. By October it is expected production will be on a basis of over 10,000 trucks per year.

In past years orders during the summer months showed a seasonal reduction, but so far this summer the volume of orders has been maintained and reports from the 40 branches throughout the country indicate that this year will not show the customary seasonal contraction.

Mack Earnings Rise

Mack Trucks, Inc., earnings in the second quarter were well in excess of the $255,197 net profits in the first quarter. June was one of the best months in the company's history. Operations were at capacity.

Increased earnings in the last four months reflect efficiency of management, volume of business and service. Beginning with March, the demand for trucks showed a big increase. March earnings alone of more than $300,000 wiped out a $60,000 loss registered in the previous two months. Mack Trucks is in excellent financial and physical condition with no funded debt, no bank loans, and more than $18,000,000 working capital.

Professional Truck Firm Is Planned in Birmingham

WOULD BUY PRESENT OWNERS' CARS

Motor transportation, conservation of individual operation transportation in Birmingham, Alabama, and nearby sections, spreading out as new roads are built and old ones improved, and providing a delivery system through operation of motor trucks by a single concern, promises to be a studied business in Birmingham. Discussion of the problems of delivery before a meeting of business men called at the instance of Henry C. Goodman, transfer and warehouse man, brought out many valuable data concerning the possibilities of the proposed plan.

This plan, as proposed by Mr. Goodman, would have private trucks taken over by a general motor delivery concern at a fair allowance to the owners in return for service to be rendered. The private concerns would thereafter be relieved of the initial cost of the truck as well as the cost of up-keep. A single large concern operating a delivery service for a large number of firms would be in position to have repairs made at a minimum cost and secure truck repair parts at minimum prices, he pointed out. He figured that a company operating on a large scale could save those making deliveries in the city and to nearby territory from 30 to 50 per cent. of present cost of private truck operation.

Sidney J. Bowie, who acted as chairman at the meeting, told of the difficulties of delivery by railroad, the several handlings necessary when shipments are made by rail, and the delays and costs incident to rail delivery. He pictured the progress in motor transportation as good roads are being provided, and declared that the future held great things in this line. Railroads, he said, were geting most of their returns from long hauls, but had to meet the competition on short hauls. He said that Mr. Goodman had invited the assembly to the dinner for the purpose of discussing a system of delivery through established agencies instead of by the individual system. Mr. Goodman, in going into details of the plan, cited instances where the system was being used. Merchants, manufacturers, wholesalers and jobbers were taking advantage of it, he said, because it offered a solution of the delivery problem.

To Check Careless Driving

The Board of Public Safety of Louisville will soon draft an ordinance that will subject all truck drivers to a physical examination and questionnaire and provide for the revocation of such licenses if the driver is careless. Seventy-five owners of truck fleets in that district recently approved unanimously this plan to curb careless driving as a means of reducing accidents. It was pointed out that insurance rates on trucks in Louisville are among the highest in the country. Liability insurance on the smallest trucks is $5 more than in Indianapolis.

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How Trucks Can Serve Railways

By R. S. PARSONS
General Manager, Erie Railroad Company

DURING the present year more improved highways will be constructed in the United States than ever before in a similar time. Federal, state, county and city appropriations, aggregating over $1,000,000,000, are being set aside for this purpose. It is the passenger vehicle which makes road construction a question of popular interest and this enormous undertaking possible, but it is the motor truck that sets the standard of road construction and makes the expenditure of economic interest. Railroads are concerned in this work, as they are taxpayers to the extent of over $200,000,000 yearly, a large amount of which sum goes into the highway budget.

The motor truck has demonstrated its ability, as a mechanical device, to move freight promptly and efficiently. Consequently, railroad managements must accept the inevitable and meet the motor truck as an ally rather than as an enemy. Inasmuch as a benign public has seen fit to provide the right of way, roadbed and track for this means of transportation, it is the duty of the far-seeing railroad man to welcome it as an aid and not condemn it as a competitor.

Below are set forth some of the conditions under which motor truck operation can be substituted for present-day railroad operation:

(1) Short branch-line operation.
(2) Trap-car service.
(3) Suburban distribution.
(4) Utilization of outlying yards in lieu of yards in congested districts.
(5) Terminal distribution.

Branch lines of light traffic are unprofitable. Motor trucks, on improved roads, can be substituted for both passenger and freight service and railroad lines abandoned. If improved roads do not exist, the right of way and roadbed of the branch line can be turned over to the proper authorities for the construction of a highway. An instance of the use of this arrangement may be found in connection with the utilization of a portion of the abandoned Delaware, Lackawanna & Western roadbed by the Pennsylvania Highway Commission in the construction of the state road between Binghamton and Scranton.

In industrial centers many industries develop freight for diversified points. This freight must be assembled at some central station, and at that point freight for various destinations consolidated. The movement of these cars of freight for miscellaneous points, between the industry and transfer platform, is known as trap-car service. It is usually performed through congested yards and in order to render proper service must be performed on specified schedule. This renders the service expensive and the cars used in this manner take up unnecessary room in the yards to the detriment of through service. This trap-car service can be performed by motor trucks through the city streets much more cheaply than it is now performed by the use of cars. The result is an expedited movement with real economy, a saving of equipment, and relief of congested yards to the advantage of carload outbound freight and inbound raw materials.

Every large city becomes surrounded by a suburban area of more or less intensive development. The use of the expensive terminals of the railroads for local distribution throughout these areas results in an economic loss and requires the development of much larger terminals than would otherwise be necessary if such local distribution were eliminated. Freight for local distribution cannot, however, be refused, as such action would affect the solicitation of profitable long-haul business. Terminal costs more than absorb the entire freight rate on local distribution of this character. Motor truck distribution through suburban areas within a radius of between 30 and 50 miles (depending on the condition of the roads) is more satisfactory and economical than similar distribution through the medium of city freight-houses and way-freights. This method of distribution in the New York suburban area should be cultivated by all railroads.

In rare instances, railroad managements have been far-sighted enough to anticipate the growth of cities and to prepare adequate yard room to accommodate the increase in business. Where this has not been done it results, in later years, in the necessity of purchasing areas at large additional cost and under disadvantageous circumstances. The growth of a city compels much additional expense on account of the elimination of grade crossings and diversions of highways; also municipal ordinances against smoke, noise and blocking of crossings make the operation of internal yards extremely expensive. The elimination of such yards; the selling of the valuable property released thereby; the use of funds so acquired in the construction of more properly designed yards without the city limits, together with the institution of motor truck service to interior stations, would without the slightest doubt prove an economic proposition in many instances.

Authorities agree that the proper measure of cost of operating motor trucks is the cost per day rather than the cost per mile. As the daily mileage increases, the cost per mile will decrease. There are so many items of this expense which are not absolutely dependent on the mileage made that an additional mile—or even two—between outlying yards and city freight-houses will not increase the cost of trucking service proportionately.

The growing opposition to grade crossings and the expense of eliminating them, the increase in municipal and state taxes; the enormous cost of real estate; render the building of industrial tracks in the heart of great business centers impossible. The motor truck here becomes a necessary aid in combating undue terminal charges.

In the city of St. Louis, with its population of nearly 800,000 people, practically all the railroads terminate their freight activities at East St. Louis, and all carload and less-than-carload freight, where there is no direct connection with an individual industry, is contracted by a trucking corporation, which provides inland stations and delivers carload freight and truck freight from East St. Louis across the bridge to St. Louis.

The system used at this point, consisting of the delivery of carload and less-than-carload freight between the railroad and the consignee on in and outbound freight, embodies the tractor and trailer system. This system takes up the lost motion on the motor unit, there being provided three trailers for each tractor. The haul at this point involves an average of about two miles and the tractor, with its 3 trailers, can handle an average of 45 tons of freight a day at a cost of about 70 cents a ton.

As a demonstration of the economy of this method, it might be cited that but a short while ago the Pennsylvania Railroad, with an all-rail line connection in St. Louis, diverted its freight to this tractor-trailer method of distribution. In Cincinnati the demountable body, or container, is used, the operation being confined to the transferring of less-than-carload freight from one railroad to another. The average haul in this operation is about one and one-half mile and costs about 51 cents a ton.

IN THE city of New York a radical departure is being made at the present time in terminal distribution of inbound freight and the collecting of outbound. Under a contract with the United States Trucking Corporation the Erie Railroad delivers its cars to the trucking company in its yards on the Jersey shore. The freight is loaded on trucks and ferried to the city, utilizing the ferries, insofar as possible, at times other than during their "peak" loading. A common rate on all freight trucked is paid to an imaginary point in West Street. From this imaginary point freight is distributed, first, to piers for steamship loading; second, to inland freight-stations; third, for store-door delivery. Different additional rates are allowed for these three methods of distribution. In case of steamship delivery, freight is unloaded on docks the same as any city freight that may be so hauled.

In the second instance inland freight-houses have been developed by utilizing ground floors of warehouses, owned by the Independent Warehouse Company, located at Beach, Greenwich, Leroy and Montgomery Streets. Through an arrangement with the warehouse company freight may be

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floored for immediate delivery to consignee or may be elevated into warehouses at consignee's request.

The third method of delivery is worked out between the trucking company and the consignee, the latter preferring in many instances to receive his freight from the trucking company for having it go through inland stations. This reduces the cost of handling freight both to the trucking company and consignee and expedites delivery. True economy, however, can not be reached in this work until specially constructed trucks have been put in use.

With the completion of the vehicular tunnel and the elimination of the ferry service, with its resultant delays, this method of delivering freight to New York will meet with increasing favor. It is a well-advertised fact that it costs as much to move a carload of freight from the railroad yards in New Jersey and deliver it in New York as it does to move the same car of freight from the same yards to Buffalo or Pittsburgh. Any method, therefore, which reduces this large expense (which is principally in the maintenance, operation and repair of lighters, tugs and docks) will be welcomed.

The New York, New Jersey Port and Harbor Development Commission contemplates the construction ot vast assembling yards on the New Jersey meadows, where cars from all railroads will be assembled; extensive transfer stations, where freight will be taken from cars and loaded in containers for transfer to tunnels; an extensive tunnel system, where small cars automatically and electrically operated will transport this freight to points underground in New York City for further distribution; warehouses and freight stations in New York to facilitate this distribution.

In the construction of the above, an amount over $200,000,000 must tbe spent and yet, when it is in operation, any freight so handled when it has reached the city must depend upon the motor truck to reach its ultimate destination, the only exception being where the receiver of freight is fortunate enough to be located adjacent to one of the terminal stations.

Were it not for the North River, the port development plan would not meet with a moment's consideration. Let us, therefore, undertake to eliminate the North River by the construction of a series of tunnels, at a cost much less than the port plan.

(1) Build a tunnel from lower New York to a point adjacent to the existing freight-yards of the Jersey Central, Lehigh Valley and Pennsylvania railroads.

(2) The new vehicular tunnel, now under construction, between Canal Street and a point adjacent to the yards of the Erie and Lackawanna railroads, will take care of freight unloaded at these points.

(3) Build a tunnel from a point near Fiftieth Street to a point adjacent to the West Shore tunnel, for the handling of the West Shore's business.

(4) Build a tunnel from 125th Street to a point adjacent to the freight-yards in the vicinity of Fort Lee ferry.

(5) Build a belt-line along the Hackensack River to the New Jersey Meadows, connecting with all the railroads above mentioned.

The advantage to the railroad lies in the elimination of the tremendous cost of lighterage, the two additional handlings now necessary in loading and unloading the lighterage, and the incidental saving of loss and damage account, a large proportion of which accrues at transfer points. The latter item for all railroads during the past year amounted to over $100,000,000.

Extending Delivery Range Adds 25 Per Cent. to Trade

By RALPH CAVALLARO

Ralph Cavallaro & Brothers, New Haven, Connecticut

WE are importers and wholesale grocers, and are the largest Italian concern in New Haven. We use motor trucks exclusively for hauling freight and making deliveries, having purchased a 4-ton truck 4 years ago, and a 2½-tonner 3 years ago.

In May, 1920, we purchased a 3½-ton Selden motor truck, which has never missed a day in 15 months' operation. This truck hauls all kinds of wholesale groceries, including flour in barrels, cheese, macaroni in 20-pound boxes, sacks of sugar, beans, rice, etc. The loads average 3 tons, and the truck is never really overloaded.

Deliveries are made around New Haven, and to other cities within a 40-mile radius. This includes Stamford, Hartford, Derby, Wallington, Meriden, Bridgeport, etc. Stamford and Hartford, 40 miles away, are the maximum distances that the truck regularly makes. When the truck makes such a trip, it requires the entire day. When it runs around the city, it can make 3 or 4 trips, the average being 2½ loads a day.

On the Stamford and Hartford trips, the truck makes about 16 stops. On a shorter run the average is about 25 stops. We plan to make deliveries, both in the city and outside, one or two days after receiving the order.

To date the truck has operated 15 months without being laid up a single day, and has traveled 11,894 miles. We consider it easily good for a minimum life of 47,500 miles. We estimate the average annual maintenance and repair charge at $300, though so far actual repairs have amounted to only $150, or 1.26 cents per mile.

The truck still has its original set of tires, so we are figuring on 12,000 miles' life. It averages about 6.2 miles per gallon of gasolene, which is exceptionally good for a truck of this size. On account of the heavy packages handled, the truck carries a driver and a helper, at $28 and $27 per week, respectively.

Our truck costs $16.61 per day, $2.22 per ton, and 35.55 cents per ton-mile. These costs are very satisfactory for this kind of work.

When the truck makes a trip to Hartford or Stamford, the cost is:

Variable expense (78 miles at 17.98c)	$14.02
Fixed expense (1 day)	1.66
Wages of driver and helper (1 day)	9.36
Total cost for the trip	$25.04

Since the load averages 3 tons, the hauling cost is $8.35 per ton, and 21.4 cents per ton-mile.

We used to handle our out-of-town trade by making freight shipments, but this proved unsatisfactory. The shipments were often delayed; and even if they went through promptly, they could not reach the customer nearly as soon as they do by truck. Now we can guarantee to make deliveries within one or two days after the order is received. This increased speed of delivery results in more satisfied customers, and brings increased business. In fact, our out-of-town trade has increased fully 25 per cent through the use of motor trucks.

For our work around New Haven we used to use horses, and although we haven't any now, we may put some of them on in the future. For our out-of-town work, however, trucks are the only things. Horses are out of the question on account of the distances to be covered, and freight is too slow and undependable.

OPERATING RECORD.

Total Period.

Period covered, months	15
Days operated	382
Total round trips	955
Deliveries, pickups	19,100
Loads, out (tons)	2,865
Total loads (tons)	2,865
Miles traveled	11,894.3
Gasolene used, gallons	1,918
Cylinder oil used, gallons	95.5

Daily Averages.

Round trips	2½
Deliveries, pickups	50
Loads, out (tons)	7.5
Total loads (tons)	7.5
Miles traveled	31.1
Miles per round trip	12.4
Load per trip (tons)	3
Ton-miles	46.5
Miles per gallon gasolene	6.2
Miles per gallon oil	125

COST RECORDS.

Investments.

Chassis, etc., complete	$4,200.00
Tire value	236.00
Total, less tires, to be depreciated.	$3,964.00

Fixed Charges—Yearly.

Interest on total investment (5 yrs.) @ 7%	$ 176.40
Taxes and licenses	25.00
Insurance	88.50
Garage expenses	216.00
Total per annum	$ 505.90
Total per month (per day $1.65)	42.15
Total for period—15 months	632.25

Variable Charges—Period.

Fuel at 25 cents a gallon	$ 479.50
Cylinder oil at 60 cents a gallon	57.30
Tires—11,894 miles ($236.00÷12,000-miles life)	234.31
Depreciation—11,894 miles ($3,964.00 ÷47,500-miles life)	993.15
Maintenance and repairs (estimated)	375.00
Total variable charges (per day $5.60)	$2,139.26
Driver's wages, helper (per day $9.36)	3,575.00
Total fixed charges	632.25
Total operating costs	$6,346.51

Unit Costs.

Cost per day operated	$ 16.61
Cost per mile traveled	.53
Cost per ton hauled	2.21
Cost per ton-mile	.36
Repair cost per mile—estimated	.032
Repair cost per mile—actual	.013

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Will Fight Anti-Truck Talk

The campaign launched several months ago by the railway and street-car lines in California for the purpose of developing public sentiment against motor truck haulers and 'bus operators has reached such proportions that plans are now being discussed for marshalling the entire automotive industry of the state to combat the propaganda disseminated by the railway interests. The automotive industry of the state, it is claimed by members of the industry, pay the railroads of the state approximately $10,000,000 annually in freight rates, and to avoid the railroads benefiting by this business several local dealers in Los Angeles have had their shipments from eastern factories come by way of the Panama Canal. The cost of the latter method of shipment is said to be less than that by rail and the time consumed only slightly more.

The Truck Owners' Association is posting 10,000 slogan cards on the highways of the Los Angeles territory, voicing such sentiments as "From City to Rural Districts"; "From Mine to Mill to Consumer"; "Truck Service Is Fast"; "Truck Service Is Direct"; and "The Solution of Progress and Prosperity."

184,580 Trucks in 12 Months

An indicated production of 271,022 motor vehicles in June established a new monthly record. It is estimated that of this number about 10 per cent., or 27,000, were trucks, leaving 244,000 passenger-cars, 6 per cent., gain over 231,619 in May, the previous record month. The production of passenger vehicles for the six months to June 30 totaled 1,016,742, against 1,514,000 in the full year 1921. Production in 1920 was 1,883,158 passenger-cars and 322,039 trucks; in 1919, 1,657,652 passenger-cars and 316,364 trucks. The monthly production the past 12 months, as compiled by the National Automobile Chamber of Commerce, follows:

1922:	Trucks.	Passenger Cars.	Total.
June (estimated)	27,000	244,000	271,000
May	24,603	231,699	256,302
April	22,227	197,221	219,448
March	19,651	152,959	172,610
February	13,121	109,170	112,291
January	9,344	81,693	91,037
Total (6 mos.).	115,946	1,016,742	1,132,688
1921:			
December	8,307	70,690	78,997
November	10,010	106,042	116,052
October	12,813	134,734	147,547
September	13,648	144,669	158,317
August	13,080	167,705	180,785
July	10,766	165,574	176,340
Total (6 mos.).	68,624	789,414	858,038
Total (12 mos.)	184,580	1,906,156	2,090,736

Federal-Aid Roads in May

Federal-aid road projects totaling 663 miles in length were completed and 541 miles went under construction during May, bringing the total under construction to nearly 15,000 miles and the mileage in completed projects to 17,038, according to reports of the Bureau of Public Roads, United States Department of Agriculture. These figures indicate that the federal-aid system grew at a rate of more than 20 miles per day on each working day of the month. Allotments of funds to definite projects amounted to $7,828,000 during the month.

Building Materials Handled at 9 Cents a Ton-Mile

By WALTER LAKE

Superintendent of Transportation, Brislin Company, Brooklyn

OUR two 5-ton Selden motor trucks are averaging 75 miles a day, hauling building material to all parts of Long Island. One of them averages only $10 a month for repairs, and the other has required no repairs since it was purchased a year ago. They operate for about $20.00 a day, and average 9 cents per ton-mile hauled.

We are dealers in building material. Our yard is located on Newton Creek, which is a branch of East River, and most of our material comes in by boat. We handle brick, cement, sewer pipes, sand, broken stone, lime, lumber, shingles, lath, etc. Our dump truck hauls nothing but brick, averaging 3,000 to the load. The other has a stake body and may haul forty 300-pound barrels of lime, or one hundred twenty 96-pound bags of cement, or 150 bundles of lath, or 200 pieces of 8x12 sewer pipe, weighing 56-pounds each. The load may weigh 6 tons, but never more than that. Both trucks do some hauling from freight yards. We also have a light-duty Selden, which is used largely on hurry-up deliveries, and carries not over 2 tons.

We regularly haul to building jobs anywhere at this end of the Island, making the 10-mile round trip to Queens, the 20 miles to Springfield, Hempstead or Hollis, or the 25-mile round trip to Mineola. The roads are pretty fair, but at jobs in the suburbs we often have to go over fields or undeveloped farm land. A dependable truck is particularly necessary on such work, because if we break down on the road we may keep 40 workmen waiting for material.

Building material can not be delivered and left in the street in large quantities, because there is a city ordinance against it. Therefore our trucks must make many and quick trips to keep the contractors supplied.

In April, 1920, we purchased our first Selden, a 5-ton dump truck; and in May the light duty, 1½-ton. On the record of these two trucks we bought the other 5-tonner in December, 1920. We still use teams for hauling about the plant and to nearby jobs, and often have as many as 20 hired trucks working for us. But we usually have a number of particular jobs, requiring deliveries in the early morning or late evening, for which our own trucks are much more economical and dependable.

We figure on our trucks working 300 days a year and averaging about 4 trips and 75 miles a day. We allow $400 a year repairs on the big trucks and figure on an overhaul at the end of 2½ years. The dump truck has cost $200 for repairs in 20 months, and the light truck has cost $75.00 in 19 months. The other heavy truck has not cost a dollar in its year's service. All three trucks have very good drivers who take excellent care of them.

The dump truck has been taken as typical. This costs $20.15 per day, 82.95 cents per ton, and 8.96 cents per ton-mile. The other would average about $4 more per day because it usually carries a helper.

On a 25-mile round trip to Mineola with a load of bricks the cost of the dump truck is:

Variable expense (25 miles at $.1503)	$3.76
Fixed expense (1/3 day)	.94
Driver's wages (1/3 day)	2.02
Total expense of trip	$6.72

Hauling 6 tons, the cost is $1.12 per ton, and 8.96 cents per ton-mile.

A 20-mile round trip is the average of our long hauls. On one occasion, however, we made a special trip to Good Grounds, Long Island, for a particular customer. This round trip was over 200 miles, but the truck had no trouble.

The following tabulation shows the operating and cost record of a 5-ton unit:

OPERATING RECORDS.

Total Period.

Period covered, years	1
Days operated	300
Total round trips	1,200
Total loads, tons	7,200
Miles traveled	22,500
Gasolene, gallons used	3,461
Cylinder oil, gallons used	150

Daily Averages.

Round trips	4
Total loads, tons	24
Miles traveled	75
Miles per round trip	18.7
Load per trip, tons	6
Ton-miles (6 tons moved 37.5 m.)	2.25
Miles per gallon gasolene	6.5
Miles per gallon oil	150

COST RECORDS.

Investments.

Chassis	$5,000.00
Body	1,000.00
Total investment	$6,000.00
Tire value	357.10
Total, less tires, to be depreciated.	$5,642.90

Fixed Charges—Yearly.

Interest on total investment (4 years) @ 6%	$ 225.00
Taxes and licenses	50.00
Insurance	385.00
Garage expenses	183.33
Total per annum	$ 843.33
Total per month (per day $2.81)	70.27
Total for period, 1 year	843.33

Variable Charges—Period.

Fuel at 27 cents a gallon	$ 934.47
Cylinder oil at 68 cents a gallon	102.00
Tires, 22,500 miles ($367.10÷15,000-miles life)	535.80
Depreciation, 22,500 miles ($5,642.90 ÷90,000-miles life)	1,410.75
Maintenance and repairs (estimated)	400.00
Total variable charges (per day $11.27)	$3,383.22
Driver's wages (per day $6.07)	1,820.00
Total fixed charges	843.33
Total operating costs	$6,046.55

Unit Costs.

Cost per day operated	$ 20.155
Cost per mile traveled	.268
Cost per ton hauled	.839
Cost per ton-mile	.089
Repair cost per mile, estimated	.017

T. C. Powell, vice-president of the Erie Railroad, remarked in a recent address that "The railroads must be relieved of the unprofitable short-haul and terminal traffic and they look to the motor truck, including the farm truck, to bring this about."

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Engineers Must Take an Interest in the Service Problem

By F. A. BONHAM
Manager, Parts Service Division, Chevrolet Motor Company

IT seems to me that the service problem is a joint one for both the engineering and service departments. The product of the designer must be tested in the hands of people who do not know very much about it, either as operators or mechanics. In many instances they are wholly incapable of mechanical knowledge. We are face to face with this fact: That the motor vehicle manufacturer must pay for the mistakes, for the carelessness and for the incompetence of both operators and repairmen, and for deficiency in design and, therefore, the construction.

The cost of operating motor vehicles will be considerably reduced if, in designing them, the engineers will take the service problem as a part of their design. As we conceive it, this should be divided into five divisions:

(1) The proper arrangement of manufacturing sequence so that parts can be assembled at low cost with a view to repairability.

(2) The design of units that may be removed by the use of simple repair tools.

(3) The design of wearable parts in such a manner that they can be manufactured at low cost.

(4) The design by the engineering department of simple tools with which the various units can be repaired, and which can be bought by the dealer or repair-shop at a small figure. These tools should be designed with a view to universal use, because 60 per cent. of the repairs made to motor vehicles to-day are made in independent repair-shops which do a general repair business and which could not afford to buy the expensive tool equipment that some service departments have been offering lately.

(5) Dependability.

It is needless to say that accessibility should be the aim at all times. Of course, simplicity should be also.

As an illustration of manufacturing sequence, with a view to repairability, my attention was called not long ago to one instance which illustrates the point we want to make. In the ordinary process of manufacturing a wearable part was the first to be replaced and around that was assembled a number of attaching parts. They were attached to the wearable part. They did not actually become a part of it, and yet, when this particular vehicle went into the shop, it was necessary to remove 14 different pieces in order to get at the wearable part, which all the time could be seen, but could not be replaced easily. The design was changed at no increase in cost to manufacture, but the wearable part was so placed that it could be removed without disturbing anything else, with a decided decrease in the time required to make a repair.

Service departments are conducting for the engineer road tests every day. They are in a position to tell him how long it will take to make a given repair and what parts wear out the fastest. They can tell him what class of repairs have to be made over and over again because of incompetent repairmen. They can tell him what parts are most affected by careless and incompetent operation, or will give trouble if there is the slightest variation in manufacturing specifications.

In the early days the men who headed the service divisions lacked many practical fundamentals, with the result that they have made extravagant claims, which on investigation have proved to be wrong. Ofttimes the engineer's investigation of these complaints has shown that had the parts been assembled correctly or repaired by competent workmen, no trouble would have resulted, and he has accordingly dismissed the complaint with the thought that his design was proper and that the responsibility for any troubles rested entirely on the user, the mechanic who repaired it, or was due to a lack of proper instruction from the service department.

This was the natural sequence of events, due entirely to a misunderstanding on the part of both the engineering and service departments as to actually what was the basis of all the trouble. The service problem of to-day is not altogether one of design, or of adequate service facilities, or of proper assembly, but also one of incompetent, careless workmanship.

At every crossroad we find a repair-shop manned by mechanics who are grossly incompetent. Many of these men are the products of the trade schools, who are commercially inclined and are not preaching thoroughness to their pupils. These shops have no equipment beyond ordinary hand tools. They could not afford to buy them anyway, because every different make of motor vehicle requires a different set of special tools, and ofttimes these cost a considerable sum. If the engineer, in designing motor cars, will at the same time work out a simple way of repairing, keeping in mind the fact that these repairs will in many instances be made by incompetent and careless workmen, the service problem will be in a large measure solved. If he will investigate the complaints that are turned over to him by service departments and disregard entirely the technical viewpoint, and approach each problem from the side of what fault in the operation or the repair caused the trouble and what can be done to minimize the result of that fault, it will have a far-reaching effect upon future design.

We can not escape the fact that the public will make mistakes; workmen will be careless and incompetent; people will drive machines until something breaks. Our task is to minimize the effect of those things which actually do take place.

The relationship between the engineering and the service departments should be one of mutual coöperation. Service departments are in a position to furnish the engineer with the details of what takes place and with the result of any corrective measures which he has undertaken. They can assist him in many ways in designing motor vehicles that will function under careless operation, or that will run after being repaired by incompetent workmen. He can assist them by decreasing their burden of supplying replacement parts for old model machines by making any changes interchangeable with the old.

The average automotive engineer has been too distant from the entire business picture. It may be that he is not to blame for this condition. It may be that he has not been educated to appreciate general business problems, but it seems that in the successful business of the future the designer and the entire engineering department should be a part and parcel of the entire business picture, and that the engineer must feel that he has a responsibility to the public—just as important a responsibility as any other department of the business—and especially to the dealer who is selling the product and the service department who is called upon to keep the product sold. The engineer must acquire business sense and he must mix with it good business judgment and a knowledge of what his design actually has to do.

We believe that the engineer of the past has been selfish enough to allow his pet theories to be incorporated in certain designs without knowing positively the value of the design, or the treatment it would receive at the hands of the public. We have known of misjudgments in exterior design to cost almost the reputation and future possibilities of a business, and who can tell of the great many millions that organizations have been forced to spend through carelessness of engineers who have insisted on incorporating their own pet and untried theories in a design.

The service department carried the burden of all these. The cost and ease of making repairs had been overlooked. The customer suffered.

May Bar Heavy Trucks

The use of heavy trucks in the Province of Quebec is likely to be further curtailed by the by-law which the executive committee has submitted to the Montreal city council for approval, for it proposes to limit the weight of the load on these vehicles to 6,000 pounds, even with pneumatic tires. There is no restriction in the by-law as to the weight of the truck itself.

Under the provincial law no truck of over 2½ tons weight is allowed on the public highways outside the city. As a consequence, although the 5-ton truck owners are heavily taxed by the provincial government, they are not allowed to operate their machines except on the city streets and the city gets no revenue or recompense for the damage they do to the pavements. The legislature, however, gave to the city power to regulate the loads and the new by-law is the result. Thus the 5-ton trucks will, if the by-law passes the council, have to carry but 3 tons, while in the case of solid tires the load is to be restricted to 2½ tons.

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A Big, New, Vital Force in the Motor Truck Industry

A GREAT step forward has been taken in the motor truck industry.

It offers every man who sells and every man who services trucks, new and important advantages in profit making.

Industrial Motors Corporation has been formed by a group of successful American manufacturers to bring together carefully selected truck companies of established reputation and to give the dealers and users of their trucks the advantages of larger resources and larger economies.

Great centralized buying power; great freight savings; greater volume of sales for individual dealers and better service to truck owners in every locality; these are few of the determined policies.

The first divisions to be included in the organization are the old and well-established Selden line of heavy duty trucks and the widely known line of Atlas "Merchants' Dispatch" trucks.

Inbuilt qualities which guarantee satisfactory performance are pledged by the resources of this soundly financed organization.

Dealers will have all that any ambitious man can ask; Profit — Security — Permanency—*Opportunity*.

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SALES DIVISION: ROCHESTER, NEW YORK, U. S. A.

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THAT idea is the basis of our new franchise. It is secure, because it offers nation-wide service facilities that have heretofore never been available.

It is permanent because there is a strong, well financed organization behind it, which embraces two well known truck units.

It will bring prosperity, because, through its more efficient plan of selling, it increases each dealer's opportunity for better profits.

These are the advantages in a truck franchise that you have desired for years; but no such opportunity was ever presented.

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INDUSTRIAL MOTORS
CORPORATION

SALES DIVISION: ROCHESTER, NEW YORK, U. S. A.

Selden
Heavy Duty Trucks

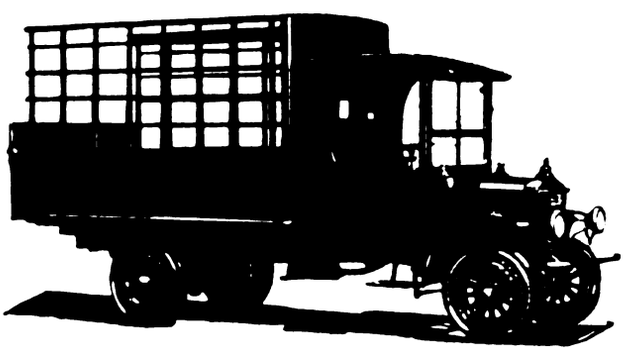
Manufactured by Selden Truck Corporation Division of Industrial Motors Corporation.

Selden Trucks have an international reputation for long economical service.

Full-flexible construction is engineered into every Selden detail. The motor for example is cradled at front support and suspended on hinged pins at the rear supports. Shocks are thus absorbed.

In England there are said to be more Selden trucks than of all other American makes.

In America thousands of owners are demonstrating the superior dependability of Selden Trucks.

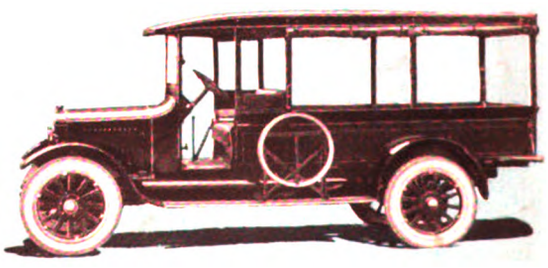


ATLAS WORM DRIVE
"Merchants' Dispatch"

Manufactured by Atlas Truck Corporation Division of Industrial Motors Corporation.

The Atlas "Merchants' Dispatch" has a nation-wide reputation for dependable low cost delivery.

Truck built, its heavier units give a strength and serviceability that insure year in and year out economy.



Not only does the Chassis of the Atlas "Merchants' Dispatch" represent the highest development in speed truck construction, but the type and finish of Atlas bodies are of an equally high quality standard.

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Comments on Motor 'Bus Design

By G. A. GREEN

General Manager, Fifth Avenue Coach Company, New York

IN its broadest sense we believe the controlling design factors from the standpoint of the motor 'bus, in the order of their importance, are:

(1) Safety.

(2) Comfort and convenience of the public.

(3) Minimum operating cost.

Safety easily heads the list and a very large proportion of the engineering development work must be concentrated under this heading. It is generally agreed that a truck carrying freight should be in all respects safe, and that every reasonable precaution should be taken to render automobiles transporting from one to seven passengers safe; so how much more important is it that a vehicle carrying fifty or more passengers should be free from every sort of hazard! It must be remembered that much of the mileage of the 'bus is through congested thoroughfares. This is not the case with the average automobile or truck. Again, the average individual makes some effort to get out of the way of a truck or automobile, but the 'bus, with its acknowledged flexibility, is supposed to move out of the paths of both vehicles and pedestrians.

The design of a motor 'bus from a safety standpoint includes certain basic features which must be incorporated in the general constructional plan. There are also other detail features which must be included. The latter are dictated by humane considerations. Reference is now being made to providing the driver with reasonable comfort and convenience so that no undue hardship will be inflicted upon him as a result of the performance of his duties. First, let us consider the former. These are:

(1) Low center of gravity.

(2) Wide frame, track and spring centers and general dimensions.

(3) Effective brakes.

(4) Short turning radius.

Beyond doubt, the future 'bus will be low hung. The inherent danger in connection with any other form of construction is the possibility of overturning. We have found that a safe and practical height of the frame from the ground for a single-deck 'bus is 25 inches and for double-deck 'bus 18 inches. The center of gravity of our type L double-deck vehicles, with a full complement of passengers on both decks, is 52 inches from the ground. With our type J single-deck 'bus, this dimension is 38 inches. It is interesting to note that when rounding corners, even at a high rate of speed, skidding will occur, due to centrifugal force and overturning is scarcely possible. Furthermore, rolling or sidesway is practically eliminated. With type L the frame and rear axle construction is somewhat unconventional. The rear axle is of the internal-gear type. The spiral bevel-gear and differential assembly is in unit form and can be entirely assembled and adjusted on the bench. The carrying member is a heat-treated forging.

In the type L the ends of the carrying members are cranked, the wheel spindles being above the drive-shaft center-line. It is in this manner that the low-level feature has been accomplished. Due to the fact that the drive-shaft pinions are in the vertical plane, a special form of tooth has been developed for the internal-gear to provide adequate clearance and at the same time permit maximum silence even after a certain amount of wear has occurred.

We do not employ this special form of axle construction for the type J 'bus. This class of vehicle will have a much wider use; therefore the matter of road clearances must be taken into account. In many cases single-deck vehicles will be operated over very bad roads. The double-deck vehicle is essentially a city job where the streets are, generally speaking, in fair condition. Again, with the single-deck vehicle, the floor level requirements are not so exacting. There is no top deck to take care of, and the entrance can therefore be located at the front end of the 'bus; but with the double-deck vehicle, conventional practice is to have the passengers enter at the rear, so in passing to the interior they are obliged to cross the rear axle, which must be of special design to have the floor level within easy stepping distance of the ground. In the case of the single-deck 'bus it is not desirable to have a step 18 inches high. Therefore the best plan appears to be to employ an orthodox rear axle design. Even assuming the use of our type L rear axle, it would not be practical to produce a step-less vehicle. The appearance would be completely spoiled and, as explained above, the ground clearance would be cut to a point where the vehicle would be unsuitable for use in many localities. Of course, a step-less single-deck vehicle can be produced, but its practical value for general utility purposes is debatable.

AMONG the constructional difficulties in connection with the production of low level equipment, one of the problems is to obtain a flat floor. There is a natural tendency for the components to project above the frame and therefore through the floor. To avoid this, special design is required. The effect of a flat floor is very pleasing to the eye. Its structural strength is greater. It is less costly to keep in repair and there is less possibility of accidents due to the passengers' feet coming into contact with the obstructions during the boarding and alighting process.

In construction wide frame, track and spring centers are features which are necessary to provide for adequate vehicular stability and, in conjunction with a low center of gravity, make for maximum safety. The necessity of providing proper stability applies equally to single and double-deck vehicles. It may be said that the added risk due to the top deck load with the latter is more than equalled by the higher speed of the single-deck unit.

Apart from the matter of safety, a wide frame is necessary in connection with the body construction. Obviously it is desirable to support the body as far out as possible, for in all cases the seating arrangement is such that the passengers are grouped about the outer edges. Then, the wide frame admits of the lightest possible form of body under frame. The wide frame also is a factor from the standpoint of passengers' comfort. This point will be referred to later.

WE believe that the overall length of a motor bus for city service should not exceed 26 feet; the total width, 7 feet 6 inches, and the overall height for single-deck vehicle 9 feet. With the double-deck 'bus, the last-named dimension should be such that a person standing on the top deck can clear a 14-foot structure. With these dimensions we have found it possible to accommodate comfortably 51 seated passengers with our double-deck and from 25 to 29 with our single-deck vehicle. Whether this practice is economically correct for all localities, we can not say. We have, however, up to the present, found that this arrangement works out very well both in our own service and in the service of those who have purchased our equipment.

Next, there is the question of important dimensions other than those overall, such as the wheel-base which naturally affects the axle load distribution, the turning radius and the general comfort and balance of the vehicle. For the class of vehicle now under discussion, we believe that the wheel-base should not be less than 168 nor more than 180 inches.

The front track should be ample in width and not less than 67 inches, for to turn a 'bus within the intersection of the average city street it is necessary to move the front wheels through an angle of not less than 35 degrees. This determines the distance between the front-axle pivots and the springs. The spacing of the front springs should not be less than 36 inches, since they are responsible to a large extent for the stabilization of the vehicle when turning a corner.

Regarding the rear track, we believe that the outer edge of the tires should closely correspond to the extreme over-all width of the body and that the rear springs should be as close to the tires as is practical. For 'buses as above described the rear track should not be less than 72 inches. This will bring the distance between the springs to approximately 52 inches. Having decided the approximate distance between the vehicle springs, it naturally follows that the best design is to arrange the frame

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dimensions so that they connect with the springs in the closest and most practical manner.

Perhaps the most difficult problem that engineers must face is the brake question. It has not as yet been solved entirely satisfactorily, at least in so far as our knowledge goes. With the 'bus the number of applications is in excess of that of the average truck or automobile, and the brakes of a 'bus must be sufficiently powerful to lock the wheels at any moment. Yet the effort required for average application must not be such that a driver may become exhausted as a result of the work imposed upon him.

PARTICULAR attention must be paid to the location of the hand-brake lever. It should be positioned so that it can be grasped firmly without moving the body out of the normal seated position. We believe the best practice is to have the lever arranged for a push and not a pull-on. Time can thus be saved, and a fraction of a second is often the determining factor from an accident prevention standpoint.

The brakes of a 'bus must be free from undue noises such as squeals or rattles. This involves, among other matters, the use of special brake-drum material. The conventional soft pressed-steel is practically useless. The best plan is to employ treated steel forging or, failing in this, steel castings with a high carbon content.

The friction surfaces must have long life, and the adjustment be such that no tools or special skill are necessary. We attach considerable importance to the matter of foolproof adjustment. The J system employs two vise-like levers. The outside controls the hand, the inside the foot brake. One turn is usually sufficient. If by any chance the levers are not returned to the vertical they will automatically reach this position by force of gravity.

The braking action must not be too abrupt. It must be positive yet not sudden and violent, for such a condition is exceedingly severe on the driving members, tires and body. It is also a frequent source of accidents from which serious claims may result. Excessively efficient brakes have a most marked influence on tire wear. It may be said that tire wear is almost directly proportionate to the effectiveness of the brakes.

In 'bus operation it is desirable from every point of view to cover the route as quickly as safety will permit. In this manner the maximum number of passengers can be carried daily. With a fixed maximum speed this means fast deceleration and acceleration. Expressed in another way, the problem is to move from a stop in one location to a stop in another in the least time. In our own service this must be done without exceeding a speed of 15 miles per hour, or accelerating or decelerating faster than 2 miles per hour per section. A still more rapid rate of deceleration is, of course, available for emergency, but it will be uncomfortable and unsafe, especially for standing passengers.

One of the great advantages of a 'bus over any other form of transportation unit is its flexibility. A 'bus can be switched around at any point, and it is highly desirable that it should be able to make a complete turn in the average thoroughfare without backing, for the latter practice, if followed in congested areas, merely adds to both confusion and congestion. There is also a marked posssibility of an increased number of accidents.

A short turning radius is dependent on the interference of the tires with the drag-link, front springs or frame, when the wheels are turned at the maximum angle. The controlling elements are wheel-spring tracks and wheel-base. As the radius of the steering angle equals the wheel-base divided by the size of the front wheel lock angle, it can be seen that a wheel-base of reasonable length is important to secure a short turning radius.

From the viewpoint of safety, the design features dictated by humane considerations are:

(1) Easy steering.

(2) Clear vision for driver.

(3) Comfort and convenience for driver.

The steering of a 'bus should be at least as easy as that of the average automobile. To operate a stiff steering-gear is a hardship that certainly should not be inflicted upon the driver of a public service vehicle. A driver's energy and effort must be concentrated on his regular duties, and if he becomes fatigued through the expenditure of unnecessary effort, faulty operation is bound to result. This renders accidents more likely. Tests have convinced us that the actual physical labor imposed on the driver of a 'bus in connection with the manipulation of a steering-wheel represents by far the greater proportion of the sum total of his work.

Ease of stering is controlled by the total ratios between the hand and road wheels. Naturally frictional losses in the steering-gear box and steering-knuckles are of importance. Minimum losses in these respects are dependent upon the use of properly lubricated anti-friction bearings. Another very important matter is that the steering-knuckle pins should lie in the vertical plane; otherwise, there will always be a tendency to lift the front end of the 'bus when turning the steering-wheel. An angle in either the longitudinal or transverse plane will cause lifting at the expense of effort on the part of the driver.

It is highly desirable that there should be an absence of shocks at the steering-wheel. This is largely controlled by the total ratio, but also by the distance between the point of contact of the wheel with the road and the intersection of the knuckle center-line and the road. Every effort should be made to keep this distance small. With the J type the length of the lever arm is about 2¾ inches; and an increase of only 1 inch would decrease the total ratio some 36 per cent. This is the only point in the steering linkage where a change increasing the total reduction does not result in increased steering-wheel travel for a given lock. A short drag-link or the incorrect alignment of the drag-link with the front springs will also result in shocks at the steering-wheel when passing over rough roads.

Minimum steering-wheel travel is important as it makes a change of hand position unnecessary for ordinary driving. It also decreases the apparent backlash, which is present in all steering mechanisms. The steering-wheel travel is roughly inversely proportional to the total raio, which is kept as low as possible for this reason.

The driver should be located close to the left side of the vehicle. This permits him to observe and also to signal his intentions to oncoming traffic. There should be absolutely nothing obstructing his view. He should face clear glass. It should also be mentioned that with single-deck vehicles the placing of the driver well over on the left side provides for the very necessary board and alighting space for passengers and adequate room for operation of door.

Briefly, a driver's vision should be such that when seated, even back of a closed windshield, he will have nothing on which he can readily concentrate his gaze, no vertical posts or obstructions of any kind. He should just naturally sense that he is in the open.

From the viewpoint of design it is essential that consideration be paid to the attitude of the public as a whole. It is not enough to consider only the attitude of the actual riders; regarding the matter of comfort from these somewhat different angles, it is necessary that attention be given to:

(1) Ridability.

(2) Reliability.

(3) Silence of operation.

(4) Smoothness o f starting and stopping.

Broadly, ridability is a matter of proper spring design. There are, however, other important influences; the wide frame, track and spring centers bear materially upon this question, for the nearer the wheels are to the outer edge of the body, the less will be the movement to which passengers must be subject when obstacles are passed over. Again, with the wider track, many of the ruts and depressions created by vehicles of narrower gage will be passed by. Incidentally, this is quite an important matter from the standpoint of road wear. The wide track also diminishes the wheel-base projection inside the body. The modern tendency is to employ cross seats and with the narrow gage vehicle the wheel-houses are a source of much discomfort to those seated inside immediately over them. A rigid frame, correct axle load distribution and minimum overhang are all factors that make for better riding performance.

APART from the points briefly touched upon above, the controlling factor from the standpoint of ridability is, of course, the design of the suspension itself. Obviously the difficulty is to obtain good riding under all conditions of load. Spring design is always a compromise; a spring must be able to withstand maximum load, yet vehicles are expected to ride reasonably well when light. As a matter of fact, they seldom, if ever, do so. In general, more damage is done to vehicles when running light than heavy because the riding properties under these circumstances are at their worst and the speed too often is high. Under conditions of heavy load, springs function best, and at the same time there is less likelihood of excess speed.

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We believe that the answer will be found largely in the employment of what we term the progressive spring. The spring is split into two parts. The top half takes the weight of the vehicle, body and a certain proportion of the load. The bottom part, or helper, comes into action progressively. The top part must make a rolling contact with the bottom. One of the great advantages of this system is the fact that for no additional cost or weight a marked improvement in performance is possible. No doubt it will be appreciated that to secure comfortable riding with a small number of passengers, it is necessary to have a spring of not over 670-pound per inch deflection. But a spring having these characteristics is not a practical arrangement, for the result would be too great a difference in body and step height between the minimum and maximum number of passengers. This point is clearly shown in a graph were the proportion of the 51-passenger load equals 28,000 pounds per rear spring, from which the comparative figures given in Table 1 are deducted.

TABLE 1.—DEFLECTION FOR PASSENGER LOAD.

	Conventional Semi-elliptic Spring.	Progressive Spring.
Full passenger-load	4¼	3¼
Maximum bumping-load	8½	6¼

The deflection curve of a simple semi-elliptic spring is a straight line showing a constant load per inch. But as the progressive element comes into play gradually, a curve is apparent. The departure from a straight line represents the load carried by the progressive element which can be designed to come into action at any desired point. It has been found most satisfactory to design this spring so that the stiffened action begins very gradually, that is to say, after a limited number of passengers have been taken on. Obviously, as the progressive element comes into action there is a gain in the stability of the vehicle.

IT IS exceedingly interesting to note the change in rate of progression as a result of a variation in passenger load. The figures based on increments of 10 passengers given in Table 2 bring this point out in a striking manner.

TABLE 2—CHANGE IN RATE OF PROGRESSION FOR VARIATIONS IN LOAD.

No. of Passengers.	Load per 1 in. Deflection (lb.)	Increased Stiffness, (per cent.)
0	670	0.0
10	780	16.4
20	810	20.9
30	850	26.9
40	900	34.4
50	1,080	61.3

For our single-deck equipment we have standardized the Mack type of rubber shock-insulator. We are experimenting with this device for our double-deck vehicle, but as yet are not prepared to state the results. This arrangement, in conjunction with our progressive system, markedly improves the riding conditions. It also avoids the necessity for lubrication and for replacement of shackles, shackle-pins and bushings; also, no spring-eyes are required. Experience up to the present shows that we may expect a very satisfactory life from rubber blocks.

It is a problem to produce a silent vehicle. It is doubly difficult to retain this state throughout the life of the vehicle. Silence necessitates freedom from engine vibration, quiet transmission gears, evenly stepped gears, a quiet rear end, and generally the elimination of all rattles and squeaks from both body and chassis. To attain this, every detail of design must receive the most minute care. Silent operation is necessary in crowded thoroughfares, and certainly the people demand this condition in the residential areas, particularly at night when the streets are comparatively empty and noises become automatically emphasized. As a rule, noises are tolerated simply because such things are nearly always with us, but in the quiet of the evening sounds that ordinarily pass unnoticed become startlingly evident. In connection with the general question of noise it is interesting to consider for a moment conditions on Fifth Avenue, New York, in the rush period during which we operate 180 'buses per hour in each direction. If this vehicular volume were not reasonably quiet, we should soon be ordered off the streets as a public nuisance and a menace to health.

From the standpoint of silence our greatest difficulty has been and still is the matter of transmission gears. We employ a 4-speed gear and 3-speed chain transmission, depending upon the class of service and general operating conditions. The shift-rods, their bearings and the lock mechanism are of substantial proportions.

The ratios of the 4-speed transmission are almost exactly in geometrical progression. The 3-speed transmission is not so satisfactory in this respect, but here a compromise is, of course, necessary. This remark applies to all 3-speed jobs. Where grades are severe, 4-speeds are highly desirable to cut down ability losses to the minimum. But where roads are practically flat, the advantages of a 4-speed transmission are not nearly so marked.

The silent-chain transmission is particularly useful for city service where there are frequent stops and starts, and where the precentage of direct-gear operation is relatively small. Substantially it is similar to a constant-mesh gear transmission but chains are used in place of gears. The shift is extremely short and very easy to effect. Such transmissions remain quiet throughout their useful life, and from our observation one can expect at least a year's service from the chains, which are cheaper to replace than gears. Chain transmissions are standard pratice for London 'bus service.

The entire design of a 'bus must be predicated on ability to give uninterrupted service between clearly defined periods, perferably based on mileage. The ability of a 'bus to fulfill this requirement with particular reference to the duration of period will at once determine the utility of the design. The public will not long tolerate an unreliable service. Failures with an automobile cause confusion enough, but the number of persons involved as compared with a 'bus is relatively insignificant.

One point it is especially desired to bring home is that under average conditions drivers can not be expected to make any attempt whatever to spare their equipment. All they are concerned with is stopping for passengers, avoiding accidents and keeping in their places on the road in accordance with their schedule. Everything must be sub-ordinated to these three things, and in cases where vehicles can not stand up under such conditions, either the required changes must be made to enable them to do so or they should be scrapped, for assuredly they have no place in the operation of a public utility.

SMOOTHNESS of starting is primarily a clutch function, but of course the driver is a factor. Correct gear-ratios, a satisfactorily performing engine and proper axle-load distribution are contributing influences. Quick starts and stops are highly dangerous from the viewpoint of possible accidents. Some of the heaviest claims for injuries and damages result in this manner. Apart from injuries to passengers, quick starts and stops do more toward causing damage to the chassis and the bodies than anything else. All driving members are subject to abnormal stresses with the former. With the latter, the fore-and-aft or lateral movement, which of necessity results, causes a loosening up of post joints, panelling, etc., and, consequently, a very high rate of depreciation.

Of the various features that make for efficient and economical operation, the clutch is perhaps one of the most important. We employ exclusively a clutch of the single-plate type. There are several unconventional features. Particular attention is drawn to the fact that the spring pressure is evenly distributed over the entire surface of the friction members by 20 small springs, the levers are balanced against centrifugal force and the disk is exceedingly light, thus simplifying the changing of gears. Incidentally, a clutch-brake has been found unnecessary. The removal of the clutch body is an extremely simple operation, as is also the adjustment of the levers.

Minimum operating cost demands:

(1) Maximum accessibility.

(2) Minimum consumption of labor and material. (This of course means excellence of both materials and workmanship.)

(3) Minimum consumption of fuel.

(4) Minimum weight, particularly that which is unsprung.

(5) Maximum safe speed. (This naturally comprehends rapid acceleration.)

(6) Maximum tire-mileage.

It is fundamentally necessary that the design of a motor 'bus be such that inspection and repairs can be carried out quickly and economically. We believe it is imperative that separate unit construction be followed. For instance, engines, carbureters, all electrical equipment, fans, clutch couplings, transmissions, control levers, axles, wheels and propeller shafts should all be entities so that the repair of any one of these assemblies will not necessitate the removal of any other.

As a practical illustration, take the orthodox unit power-plant and assume it is necessary to renew the clutch friction linings. The propeller-shaft, transmission and complete control system must first be taken down, possibly even the engine moved forward. In all probability the vehicle must lose a complete day's service. Compare

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this for a moment with the relatively simple operation where the separate unit form of construction is employed, as with the J and L types. Here we need only remove a few bolts from the clutch coupling and housing. The clutch can then be taken out as a complete unit and the linings replaced within a period of 20 to 30 minutes.

The unit system, if properly carried out, guarantees minimum loss of 'bus-hours, minimum operating cost, and minimum difficulties from the standpoint of training employees. Obviously, less skill is required on the part of mechanics where they are constantly performing the same operation; here it is simply a question of specialization. But where the construction is such that multi-repair operations are required, the situation is much more complicated. Summing up, to be obliged to remove several units before a faulty unit can be inspected, repaired or replaced, is a condition not to be considered for a moment. Such practice would be ruinous from a public utility standpoint.

IT MUST be remembered that the general conditions surrounding repair work are seldom ideal. There is the matter of wet floors, dirt surrounding the various units, often lack of light. Garage repair forces must work Saturdays and Sundays, which is not particularly attractive. It is exceedingly difficult to find men who are willing to work nights. Taken as a whole, the conditions surrounding the work of the repair-men seldom bear favorable comparison with modern high-class factory practice. Here again we wish to emphasize the desirability of unit construction, for the theory is to remove the defective unit and take this to a central repair plant having all the advantages of the modern factory, so that the repairs can be promptly executed by skilled men working under the best possible surroundings.

In connection with the matter of accessibility, it should be remembered that repairs and adjustments must be occasionally carried out at night, sometimes under most unfavorable conditions. Again, assuming the use of low-level equipment, the design should be such that inspections, repairs and renewals can in practically all instances be undertaken from the sides or underneath the vehicles. This means the use of pits. The practice of providing trap-doors inside 'buses is not desirable. Trap-doors weaken the bodies, are a possible source of accidents, can not be kept tight in place, permit exhaust gases to leak through, and create undue noise. Experience has shown that it is highly unsatisfactory to carry out chassis repairs from the inside of the body. If this practice is indulged in, claims are bound to result from passengers due to their clothes coming into contact with grease or dirt. Mechanics are sometimes careless and this results in unnecessary damage to the interior fittings, particularly the seat cushions.

From a financial viewpoint the success or failure of a utility operating 'buses depends upon the cumulative additions or subtractions of small amounts expended on either labor or material. Sometimes the items may appear insignificant but, taken as a whole and over lengthy periods, the story is entirely different. When working a 'bus is a heavy consumer of both labor and material. The consumption is perhaps much greater than is generally supposed. To afford a practical illustration, Table 3 representing the actual consumption by our company of some of the major elements for the year 1921, may be of interest. These figures are based on the average of all 'buses.

TABLE 3—FIFTH AVENUE COACH CO.'S COST PER BUS FOR 1921.

Gasolene			$1,125.94
Lubrication			109.42
Tires			284.34
Repairs to chassis	Labor	$676.97	
	Material	759.81	1,436.78
Repairs to bodies.	Labor	359.00	
	Material	162.44	521.44
Drivers			3,071.71
Conductors			2,692.48
Total			$9,242.11

From a casual study of these data it will be seen that a relatively small percentage of saving, if applied to any of the items and then multiplied by a large number of vehicles, must total a vast sum annually. If one assumes that the equipment in question is of good design and that its maintenance is economically undertaken, then how much more important does this issue become when the reverse is true.

Perhaps it will not be out of place here to point out that the profit of the average utility expressed percentage-wise, usually does not run beyond one figure, and that there are a vast number of utilities where the figure is in red. To change the color and to exceed the single-figure basis, requires all that is best in design, material, workmanship and operating care.

Aside from the human elements which have been covered in a previous paper, "Motor 'Bus Transportation," (in POWER WAGON for September, October and November, 1920,) the major issue, of course, is the engine. We employ exclusively the sleeve-valve type. From our viewpoint this type possesses certain basic advantages which make for economy of operation.

First, taking the question of fuel, high gasolene-economy is possibly due to:

(1) Absence of valve pockets and the spherically shaped combustion-chamber. (Incidentally, this permits of high compression being employed.)

(2) Positive action of valves at all speeds. (With poppet-valve engines, valves at high speeds tend to float due to weak or broken springs.)

(3) Extraordinarily low friction-horsepower.

(4) Ideal location of the spark-plug.

NEXT, there is the question of service. In this respect we believe the sleeve-valve engine has the following advantages:

(1) The performance remains reasonably constant throughout the usual life. It is not necessary to make adjustments constantly to permit of satisfactory and uniform behavior.

(2) Throughout the useful life the performance tends to improve.

(3) Practically no adjustments can be made since there is nothing to adjust. This alone represents a considerable saving in the garage force.

(4) Throughout useful life there is little, if any, increase of noise due to wear.

(5) Cost of repairs is small since there are very few operations requiring skill.

(6) Cylinders never require reboring. This obviates the necessity of carrying in stock second-standard pistons and rings.

The performance of a correctly designed engine is largely a function of its carbureter; therefore a wide variety of results is always obtainable with varied settings. The points which are brought out in Table 4 are of special interest.

TABLE 4—HORSE-POWER AND TORQUE DATA FOR TYPE-J 'BUS.

Horse-power developed at 1,000 revolutions per minute	36.2
Horse-power developed per cubic inch of displacement	0.12
Weight of vehicle per horse-power, pounds	301
Weight of vehicle per cubic inch of displacement, pounds	36.2
Maximum torque, pound-foot	194
Speed for maximum torque, revolutions per minute	800
Decrease in torque at 400 revolutions per minute, per cent	5.1
Decrease in torque at 1,400 revolutions per minute, per cent	11.9
Speed for maximum torque with a 5.4 to 1 rear-axle ratio, miles per hour	16.1

DURING 1921 our entire fleet of 'buses averaged 50.7 ton-miles per gallon. The carbureter is of the Zenith type. There is no exterior adjustment. The throttle spindle is 7/16 inches in diameter, hardened and ground. There is a total of 4 inches spindle bearing area. There is a gland with a suitable packing at the front end and a blank nut at the other. With the 'bus there is an abnormal amount of throttle movement and, unless this factor is taken into consideration from the standpoint of design, rapid spindle and bearing wear will take place. All screws, nuts, plugs or unions are of ample size. The butterfly is exceedingly well fitted and provision is made for a simple throttle-stop adjustment.

In the earlier days of 'bus operation the tire question was one of our chief anxieties. To-day the situation is very different, for wonderful improvements have been made in tire manufacturing methods. Of course, there is no sense in decreasing tire expenditures at the cost of the equipment generally. Resilient tires are essential and too great a wear must not be permitted. It is our regular practice to remove a tire immediately the rubber has worn to within 7/8-inch of the hard base.

In looking back over our records it is extremely interesting to note that in 1911 our cost per mile for tires was 4.93. From that date on a steady reduction has been effected. The figure for 1921 was 0.87 cent per mile, and this, of course, includes the use of six tires. From our view point the various factors which have permitted this condition to be reached are, in the order of their importance, as follows:

(1) Better tire manufacturing methods.

(2) Improved vehicle design. This includes decreased weight, particularly unsprung weight, the substitution of metal for wood wheels, etc.

(3) Closer supervision from an operating standpoint.

(4) Closer supervision from a maintenance standpoint.

As the result of long experience in connection with the design, construction and operation of 'buses, we are convinced more than ever that trucks or automobiles, modi-

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fied or unmodified, are absolutely incapable of giving satisfactory and economical service if operated as 'buses. The tendency to-day is to employ trucks or automobile chassis as 'buses, or to attempt to modify their construction, then to rechristen them. This is a dangerous policy from the standpoint of both the builder and user, and eventually it must surely result in dissatisfaction and disillusionment to all parties.

There is another and very important matter. We must not lose sight of the fact that the 'bus has not "made good" in some of the localities where it has been tried. We are constantly confronted with failures such as those at Des Moines, Toledo, Kansas City and other cities. Such failures, when analyzed, invariably point to the fact that the combination of extemporized equipment, indiscriminate operation, overloading and lack of experience is responsible.

Heil Swinging Partitions

Concrete roads, throughout the country, are now being constructed with a minimum amount of hand labor. Instead of the old method of motor trucks depositing the aggregate along the roadside, men shoveling it into wheelbarows and wheeling it to the skip of the mixer, material is now dumped direct from the truck body, in properly proportioned amounts, into the skip of the mixer. This method does not require any extra handling of the material or aggregate.

At the loading bins the proper amount of gravel and sand and the necessary number of bags of cement is placed in each compartment and the truck is then driven at a rapid rate to the place where the road is under construction. The truck turns on its own power and backs up to the skip of the mixer. The truck driver releases the manual tail-gate control which allows the rear compartment to empty its contents into the mixer. Then the truck pulls ahead. To empty the second compartment the operator lifts the handle which operates a shaft on which are two eccentric bearings. By raising the handle these bearings lift the partition vertically until lugs in the bottom of the partition disengage from the floor of the body allowing the partition to swing open in the same manner as the tail-gate. This process is repeated until all the compartments are emptied.

The Heil Company has perfected these swinging partitions so that they meet the requirements of the concrete road builder very satisfactorily. The partitions can be installed in any body, old or new; all that is required is the necessary dimensions. The partitions are bolted to the top flange of the body on the outer side and can be adjusted to suit a change in the size of the mixer or be removed entirely when it is desired to haul other materials.

Railway Withdraws Truck Plan

Following bitter opposition in the British Parliament, the London & Northwestern Railway has withdrawn a bill it introduced asking power to inaugurate a system of "contributing" passenger motor truck services on the highways. The principal objection was the fear of creating a precedent with consequent over-promotion of similar traffic lines by other companies.

Trucks Make Possible 24-Hour Cut-Flower Delivery

By THOMAS HASKELL

AN immense amount of labor is involved in keeping New York supplied with fresh flowers. The system of collecting the perishable cargoes, shipping them with the least possible delay, and rushing them to the ultimate consumer is as carefully organized as the milk supply. Every hour which elapses between the time the flower is cut and its final purchase directly affects its value. The flower market never sleeps.

New York regularly consumes so large a supply of cut flowers that it is necessary to gather them daily from surprising distances. Countless nurseries, large and small, within a radius of 150 miles of the city are required to meet the demand. Flowers are also shipped in large quantities every day from Boston. By purchasing from so wide an area the danger of failure to local crops is avoided, and the supply can be counted upon to pour in steadily, good weather or bad and in and out of season.

The motor truck has been of great assistance to the city flower market. This direct means of transportation from the nursery to the city markets saves much valuable time. It is no longer necessary to carry the flowers to the nearest railway station, and, after the delays of late trains and poor connections, ship them across the ferries to the flower markets. The motors pick up the flowers at the nurseries and deliver them direct to the city markets. The flowers must be handled with the greatest care and protected from changes of temperature.

Most of the flowers harvested within a radius of 100 miles or more of New York are cut each day in the late morning. They are then laid in water for the journey they are to make. Without this preparation they would not stand the strain. The length of this bath varies with different flowers but runs from one to four hours. The flowers are then packed loosely in shallow wooden boxes when they are ready for shipment.

The loads of flowers arrive for the most part during the night. Any one who chances to pass late at night through the wholesale flower markets in the vicinity of 28th street and Sixth avenue will see lines of trucks unloading. The stores do not as a rule keep open to receive them, but entrust the motor drivers with keys. The doors are unlocked, the flowers set inside and the doors locked for the rest of the night.

The wholesale flower markets and exchanges open very early in the morning. The flowers are unpacked and sprayed and laid out on long tables or placed in ice boxes according to the temperature. The buyers from thousands of florists in all parts of the city are there early. Incidentally the prices of flowers in the markets fluctuate as rapidly as stocks and often apparently with as little reason. It is not uncommon for the price of cut flowers to jump 100 per cent. or fall 50 per cent. over night. The purchases being made, the flowers are rushed to the shops in New York and Brooklyn. This organization makes it possible for flowers cut late one morning to be placed on sale in the markets by daybreak the following day, and be delivered to the shops before 11 o'clock of the same morning. The entire operation of cutting the flowers, preparing them for market, shipping them perhaps 100 miles or more, marketing and delivering them takes as a rule less than 24 hours.

The shops must now prepare the flowers for delivery. Unless most flowers are kept in ice boxes for several hours they will not keep their freshness and brilliancy. After being intelligently prepared, however, they will keep for several days. Considering the increased cost of raising flowers and transporting them, the present prices are comparatively low. The cost of labor in the greenhouses and nurseries has risen over 100 per cent., and that of coal considerably more. No expense is spared in reducing the time of transportation.

It is common for the florists to issue price lists of flowers weekly to their customers, and this introduces another element of chance. The florist must, of course, abide by his prices and stand the chance of their going up during the week. There is a surprising amount of shopping done among the most fashionable flower shops on Fifth and Madison avenues. A person who wishes to have a dinner table decorated or a room prepared for a wedding or reception will often obtain estimates from several different florists. The competition tends to keep the price of flowers down.

Most of the fashionable florists employ regular decorators who are specialists in floral designs. Many of them receive as much as $100 a week for their services. These men or women will prepare the designs for a floral decoration and see that it is carried out in detail. When thousands of dollars are being spent for floral decorations the additional expense of expert advice is, of course, trifling. The decorators specialize in different designs. One will decorate dinner tables, another looks after the flowers in reception rooms, another specializes in church decorations. There are a number of decorators who do nothing but design corsage bouquets which will harmonize with a particular dress or the coloring and character of the ladies who wear them.

Nowhere else in the world is money spent so lavishly for flowers as in New York. A few years ago a bouquet costing $50 was considered very elaborate. To-day thousands of dollars are spent without a thought on wedding or funeral flowers.

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Effects of Highways on Motor Transport Economy

By LORD MONTAGU OF BEAULIEU

THE cost of transport affects the condition of every country, and the cost of almost every article produced and consumed in it. Bad roads add to the cost of transport, and are a burden on the owners of vehicles, though they do not always realize the difference in the cost of operation, maintenance, and repair of their vehicles when used over good and bad roads respectively.

There are four principal effects of bad roads reflected in the wear and tear of motor vehicles. There is, first, the crystallization and fatigue produced in all metal structures by constant shocks and vibration, as, for instance, by pot-holes, corrugation, uneven stone blocks, and other irregular surfaces. There is a definite and ascertainable deterioration of the metallic structure in axles, axle housings, frame, cardan-shaft, steering-gear, and other parts of the vehicle specially subject to this road vibration. Most of the shocks, although individually of very short duration as a rule, are at the same time of great intensity in some cases. For instance, an ordinary 3- (long) ton truck, weighing with its load about 7½ (long) tons, at 15 miles per hour—a very ordinary speed—has often to run through pot-holes sometimes as much as 2 inches deep, or over corrugations whose wave lengths, if the expression may be used, from the highest to the lowest points are generally 9 inches to 12 inches apart. On modern roads there is an almost unyielding surface on the far side of these obstructions or holes for the wheel to strike. The blow at the point of the impact is often, in force, as much as three times the weight of the vehicle, and in quite ordinary cases equal to one and a half times to twice its weight, or in the case of the 3- (long) ton load vehicle mentioned an impact shock of 15 to 30 (long) tons. This blow and shock has to be taken up first by the tire, generally made of solid rubber, which, unfortunately, after a good deal of use, loses a large proportion of its natural resilience. After the tire and wheel come the springs, comparatively stiff in character in the case of a motor truck, which are compressed and relaxed quickly and constantly. Next in order to share in the shock comes the frame, and eventually the transmission gear, the engine bed, and engine itself.

In the second place, there is the definite wearing of certain movable parts, which themselves have to move with shocks or vibrations, such as the leaves of the springs, the spring shackles and bolts, and wheel brake bands and brake connections. Again, the various rods and the worm-gear connecting the front wheels with the steering-gear are in a state of constant movement.

In the third place, a considerable amount of extra power is necessary to propel a vehicle of equal weight and encountering wind resistance at the same speed over a bad road as compared with a good road. From tests the author made, in the engine and gears, some time ago with a truck carrying 3 (long) tons, he is of the opinion that under bad conditions, such as an uneven and muddy road, the consumption of fuel is increased by at least 50 per cent. compared with a good hard smooth road. On a road full of pot-holes and corrugations, but with a hard dry surface, the increase in consumption varies from 25 to 30 per cent.

Fourthly, in the case of bad roads where the wheel is constantly interrupted in its actual contact with the road surface for fractions of a second owing to the bumps and subsequent hollows, there is much extra wear and tear on tires, on account of the tendency to sudden acceleration and deceleration in the rotation of the wheel, driven, as it is nowadays, by considerable engine power. This sequence takes place on every occasion when the wheel is not actually in close touch with the road surface. Again, the blows given to the tread and fabric of the tires by uneven surfaces tend to make them wear out much more quickly, in the case of both solid and pneumatic tires. Though pneumatic tires undoubtedly damp down and neutralize small vibrations, and minimize to some extent larger vibrations, a really bad road causes severe strains on the rims, walls, and general fabric of these, and on the air valves and security bolts, especially if there is any attempt to run at high speeds.

From the foregoing instances of how depreciation is occasioned to vehicles by bad roads, it is clear that well-made and smooth roads are of great value to road users. If in various countries the taxes for road improvement placed on motor vehicles were even heavier than they are to-day, the payers of those taxes would recoup themselves many times over in the consequent saving, were the roads they use put in good condition, and vehicles enabled to run over comparatively smooth surfaces instead of over uneven and rough surfaces, which are now only too common.

One, therefore, comes by natural sequence to the problem of how smooth and strong roads can be provided for the mechanical traffic of to-day and the future. In the case of the heaviest trucks their rear axle weight amounts sometimes to as much as 6 to 7 (long) tons. A load of 3 to 3½ (long) tons on each wheel is possible and by no means rare. Such a heavy load should be borne not only on strong wheels and broad rubber tires, but the wheels should be of comparatively large diameter, say, a minimum of 3 feet or 900 mm., heavily laden wheels of small diameter being most destructive of road surfaces, due to their small bearing surfaces on the road. But, considering the universal tendency to-day to increase weights carried by each vehicle, the author is inclined to think that the time has arrived when the weights of the heavier road motor vehicles should be borne on more than four wheels. Already certain systems use six wheels, with the power-plant separate from the carrying vehicle, and the use of trailers is also becoming more common, which insures that the weight on any individual wheel is kept within reasonable limits. A further increase in the weight of any vehicle must necessarily bring about the employment of more axles and wheels.

It must be borne in mind that the problem of making roads strong enough to withstand the increasing strains, to which allusion has been made, is to-day one of finance, and only in a secondary degree one of engineering. Most competent modern road surveyors and engineers, if given sufficient money, can make a road strong enough to stand almost any strains and its use by vehicles at almost any speed. But to make such a road is very costly, and the expense increases rapidly if heavy weights at high speeds have to be provided for. Already roads specially surfaced cost as much as $3.60 or even more per superficial yard in the case of main trunk roads through country districts in England, and as much as $7.20 to $9.60 per superficial yard in the case of much used streets in towns, which are paved with stone or wood blocks, or asphalt laid upon concrete foundations. It is clear that in over-taxed and over-rated Europe such a cost can not continue to be provided, except in special cases, where the heaviest and most constant traffic exists, and if only these expensive surfaces last for a really considerable period of years during which no repairs of any consequence are necessary. A cheaper form of road-making is, therefore, very desirable if we are to continue to improve our highways in strength and smoothness, and road traffic is to be worked economically.

Improvements in the methods of road-making and in the diminution of cost are of immense present and future interest to the users of mechanical vehicles, for governments and local authorities are finding it increasingly difficult to obtain money to spend on road improvements and maintenance. It is, at the same time, incumbent on designers and makers of mechanical road vehicles to spread the weight of their vehicles over more wheels if possible, and to limit the total weight borne on each wheel to more reasonable amounts, say, 2½ (long) tons maximum.

The author has shown the cost of bad roads to every owner and user of a road vehicle, and each nation as a whole has eventually to pay more for the extra cost of its transport under such conditions, which in turn increases the price of every kind of article to the manufacturer and consumer. To save this waste, there must be more coöperation between road makers, designers of road vehicles, and road users, to promote economy in the up-keep and improvement of roads, which at once reflects itself in cheaper transport.

The United States leads the world in the export of motor cars and trucks. Forty per cent. of 1921 automobile exports came directly from factories in the U. S. A. Ten per cent. more were exported from U. S. branches in Canada, and the bulk of the 25 per cent. exports from France were re-exported U. S. war vehicles. Ninety per cent. of this business was done by Italy, 7 per cent. by Germany, and 4 per cent. by England.

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Preventing Highway Destruction

By JOHN H. MACKALL

Chairman and Chief Engineer, Maryland State Road Commission

WE have in Maryland a total of about 15,000 miles of public roads. We have improved about 1,700 miles of that 15,000—12 or 13 per cent. It has a portion of improved roads in percentage second to no state in the union. The condition in which they are maintained is second to no state in the union, and the service which they are rendering to the public is second to no state in the union.

There was talk in Congress a year or two ago about a federal system of highways, to which the federal government would contribute a certain percentage of the cost. A bill was drawn providing for a maximum of 7 per cent., constituting a system of roads, of which 3 per cent. was to be the primary system and 4 per cent. the secondary system. I cite that to show that the percentage of improved roads in the United States is very, very small. Taking the approved types, no more than 2 or at the most 3 per cent. of the road mileage in the country are improved roads. Then it simply behooves us to protect for as long a time as we can those highways which are rendering and are capable of rendering satisfactory service. And I ask if that is being done? Is everything being done to conserve the system of highways or the improved highways or these semi-improved highways as they exist? Have not we taken up and helped to carry on the propaganda put forth by the professional propagandists in believing that roads mean new roads, not old roads, not good roads, not usable roads, not serviceable roads, but new roads.

The motor vehicle manufacturers and highway officials recently held a conference and the whole thought was financing—getting money enough to build a system of roads—the most laudable ambition in the world to build a system of roads. But after all, is the public interested in the type of road we build, or the width of road we build, or the kind of road we build, except we build a serviceable road and one that can be used every day in the year? I maintain the public is not interested at all whether a road is concrete or macadam or asphalt, or what not, but it is interested in a road which it can use with safety and comfort every day in the year.

I maintain there are many miles of road which could at small expense be made to meet with specifications which are being destroyed in order that we may build more roads. And why do we build more roads? Because we have been completely imbued with the idea that only a new road is a good road, one that has just been built. One of the largest producers of a commodity entering into so-called good roads started the slogan a few years ago, "Build the road to carry the load." You could not find fault with that. Fine! "Build the road to carry the load." What load? Any load that any unscrupulous manufacturer may want to put upon it.

I maintain that the system of roads we have is as it is to-day because we have been sold by the man whose business is to sell an idea. We maintain in Washington perhaps more propagandists than any place in the world—certainly greater than in any place I have ever seen them—high-grade men, paid high salaries, to sell the idea that we must go out and build more roads—to carry the load.

I started in my little way, and it was less than I thought, to combat that propaganda, to build the road to carry the load. I asked that manufacturer if he would not substitute for that, "Limit the load to one that the road will carry." "No; it does not sell our commodity. I am not paid to do that. Build the road to carry the load."

More dollars are being squandered in permitting big trucks to destroy serviceable roads in every year in the United States than is being put in new construction every year in the United States; and yet we say we are trying to solve it, by getting less miles of usable road at the end of every year than we had at the beginning of that year. It is not solving it, and can not solve it.

Solving the problem of the highways of the United States applies in the same degree to the total mileage of usable highways in the State of Maryland. So we have started out in our little way to see that the highways in Maryland shall be used by vehicles so designed, so constructed and so operated as not to do unreasonable damage to the public highways. And we have said, for the sake of argument, that a truck may not carry more than the weight for which it made an application and paid a fee, which in turn is based upon the weight of that vehicle.

Therefore if John Jones were an honest man and paid a license for a 2-ton truck, he should be assured that the people who are competing against him are not taking out a license for a 4-ton truck and paying a 2-ton fee. So in common honesty we say that the trucks shall not carry more than the weight for which application has been made and a fee has been paid.

Second, a man shall not carry a load in excess of 650 pounds per inch of tire width.

Third, that under no consideration may any motor vehicle of any kind carry a load in excess of 20,000 pounds—5 tons of load, perhaps, and 5 tons of dead weight.

On the question of uniformity in vehicle laws, I maintain that the roads in Podunk should not, will not and can not carry the same kind of traffic that the streets of New York carry. I maintain it is not necessary to have in the rural sections of the State of Maryland the same type of road that we have on Fifth Avenue, New York. I maintain also that the road down town to the city does not need to be the same type of road, to carry the same type of traffic, as on Fifth Avenue of New York. I maintain there must be different types of road, different conditions of road, and different strengths of road. If that is so then we must have different weights for the vehicles which go over them. And we have got to have a different type of load going over a road at one season and at another season.

Why have we permitted grossly overloaded trucks to be operated on and to destroy the public highways in the United States? Because the same propagandists have said we can not prevent it; if we limit the size of the truck we curtail the industrial expansion of the country and that we can not do. We hear that objection, and we let it go, and we say that we are not going to curtail the industrial expansion of the country.

The road from Washington to Baltimore and Philadelphia during the war carried a tremendous amount of traffic, war traffic and all other kinds of traffic, but we called it all war traffic. Anyway, it carried enough traffic to destroy it, as every other highway on the Atlantic Seaboard was destroyed during the war—destroyed so nobody could use them. The Bureau of Public Roads, Department of Agriculture, made a disinterested study of the traffic that went over that road. We kept account of the traffic, the weights, one day a month for two or three years. But they took it for one month and they demonstrated that if all the loads of 5 tons or larger had been carried in units of 3 tons, and allowing the manufacturers rated efficiency for the 5-ton unit over the 3-ton unit, it would have cost those operators an additional $15,000, and it cost the State of Maryland the tidy sum of $600,000 to remedy the damage which was done at a saving to the operators of $15,000.

WE PASSED the law and then we started out to enforce the law, and again they said it could not be done. It is the easiest thing ever undertaken—all we need is a little portable weighing device. Two of them together will weigh about 100 pounds. We stick them in the back of a flivver, and we go along the road; we find a truck that is overloaded; we weigh it. If it is overloaded then and there we take off the amount of the overload, and then take the driver to the judge and let him tell his story. That is all we have to do—just weigh the load, take off the overload, and take him to the judge and let him tell his story.

Perhaps there is no warrant in law for making him take off his overload. We maintain there is, and nobody has ever substantially maintained to the contrary. I do not believe, perhaps, there is any law which

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says that if we find a crook with our money we can take our money away from him, but we generally do it, and the crook never says anything. So when we find the crook with his overload we take off the overload, put it on the side of the road, and let him get it as best he can.

There is the whole story of eliminating overloads on highways, by means of portable devices. We started out and we had these portable devices. The first day we obtained 60 arrests and convictions. The first week we obtained something like 150. The second week we got about 50; and the third week we got 15; and the fourth week we got none. Of the 130,000 vehicles in the State of Maryland to-day not one-hundredth part of one per cent. is carrying an overload at any time, simply because we have a little accurate portable weighing device that we stick under the truck and jack up the rear end, and record the weight. And if it is overloaded we have the driver tell it to the judge.

When they tell us that we can not prevent overloading upon the public highways in these United States we say we must do it and we are going to do it, that it can be done, that it has been done for a period of three years, and is going to be done as long as crooks who attempt to operate upon the public highways in the little State of Maryland insist on carrying a load greater than the law permits them to carry.

If we are not going to do that, we are going to continue as we are to-day building roads which we can ill afford, roads which we can not afford if they are built unnecessarily strong. Suppose, for instance, we are going to build a road a certain width, a certain depth, to carry all the traffic that wants to go over it, except motor vehicles carrying a gross load in excess of 5 tons, or a gross load in excess of 10 tons, or a gross load in excess of what figure we have set up. Suppose now the overloaded traffic is one one-hundredth of one per cent. of the total, and it is not any more. Suppose, then, that that road costs, say, $20,000 a mile to build, and it generally costs that, taking the country over. The interest on that $20,000 is so much money—the amount depends on the rate of interest. To build that road, then, to carry the total load will cost an additional $10,000. The interest on the $10,000 at 4½ per cent is $450 a year. Before we can justify that additional expenditure, we first must see what that additional expenditure is going to be, and if the overloaded trucks can save, not to themselves, but to the country at large, enough money to pay $450 per mile per year, then we are justified in building a road for them. If they can not, we are not. And when we say that all the traffic that goes over a road must earn $900 a year, and one-hundredth of one per cent. must earn $450, or 50 per cent., we read them out of court; it can not be done.

So unless we are going to limit the load to that which the roads will carry, and limiting by actually putting off the highways the vehicles which are overloaded, we are going to saddle upon this country a tremendous burden in excess of the country's ability to pay, or we are going to build a system of roads too light, one which will be destroyed, one which can not be used by anybody.

Associated Motor Industries

(*Continued from page 5.*)

truck, car wheels, truck bodies, and wagons.

Saginaw Sheet Metal Works, Saginaw, Michigan — manufacturer of sheet-metal parts for cars and trucks.

Traffic Motor Truck Corporation, St. Louis—manufacturer of Traffic trucks.

Murray-Tregurtha Corporation, Boston —manufacturer of gasolene engines.

H. F. Holbrook Company, New York—manufacturer of bodies.

The officers of the corporation are announced as: Chairman of the board, Will I. Ohmer; president, Louis Ruthenburg; vice-presidents, A. A. Gloetzner, Robert V. Board, T. C. Brandle, George M. Dickson.

Board of Directors: Chairman, Will I. Ohmer, president, Recording & Computing Machines Co.; Robert V. Board, president, Kentucky Wagon Mfg. Co.; A. A. Gloetzner, president, Covert Gear Co.; James R. Duffin, president, Inter-Southern Life Insurance Co., Louisville; Louis Ruthenburg, formerly general manager, Delco plant of General Motors Corp.; H. G. Stoddard, treasurer, Wyman-Gordon Co., Worcester, Mass.; H. V. Hale, general manager, Saginaw Sheet Metal Works; H. J. Linkert, treasurer, Recording & Computing Machines Co.; C. L. Hallady, vice-president and general manager, Jackson Motors Corp.; W. W. Sterling, vice-president, Jackson Motors Corp.; C. L. V. Exselsen, vice-president-treasurer, Roland A. Crandall & Co., Chicago; Guy Wilson, president, Traffic Motor Truck Corp.; T. C. Brandle, vice-president, Traffic Motor Truck Corp.; G. M. Dickson, president, National Motor Car & Vehicle Corp.; Buell Hollister, Pyne, Kendall & Hollister, New York; H. F. Holbrook, president, H. F. Holbrook, Inc.; M. Douglas Flattery, chairman of board, Murray-Tregurtha Corp.

Finance and Adviosry Committee: Will I. Ohmer, Louis Ruthenburg, James R. Duffin, Carl L. V. Exselsen, R. C. Morse.

Executive Committee: A. A. Gloetzner, Louis Ruthenburg, Robert V. Board, H. V. Hale, T. C. Brandle, G. M. Dickson, H. J. Linkert, C. L. Halladay, Will I. Ohmer.

In the organization of the corporation complete title to the plants and all assets of the constituent companies are owned in fee simple by the central corporation. The financing of the merger is conservative. None of the securities offered are for plant betterment, as all the plants are in first-class operating condition now.

The assembling units are at Boston, Oakland, Indianapolis, St. Louis and Lousville, thus establishing a sweep of finishing plants in a big curve that covers the country from coast to coast. By bulk shipments of parts and deliveries from the assembling plants it is figured that cars can be put down practically freight free anywhere east of the Rocky Mountains.

One of the most important innovations is a $35,000,000 fund set aside for financing the organization's dealers. This fund will be increased in later years, if necessary. In fact the bankers' syndicate interested in the plan will authorize the use of up to $100,000,000 for this purpose at any time it is called for under the specified conditions.

By the plan of 90 per cent. of the dealers liquid working capital will be provided. Roland A. Crandall & Company, investment bankers of Chicago, have worked out the details as a result of their experience in financing sales. The plan makes the dealer an integral part of the corporation, carries his financial burden for him and furnishes effective aid to his sales efforts.

All operations of the Associated Motor Industries will be directed by Mr. Ohmer from the central offices in Dayton. Louis Ruthenburg, president, in general charge of production, resigned from General Motors to join Associated Motor Industries. He was manager of the Delco plant of General Motors and manager also of the manufacturing division of the General Motors Research Corporation.

The company plans a production from July 1, 1922, to July 1, 1923, of 30,000 automobiles and 13,000 trucks, this being on the basis of 50 per cent of normal output. The passenger-cars to be sold under the "National" name. A complete line of "Traffic" trucks will be made, ranging from a "speed-boy" to a 3½-ton unit.

Associated Motor Industries as it now stands has assets of about $25,000,000, of which roughly half is fixed and half liquid. It owes only $1,000,000 in trade accounts. Against the $25,000,000 assets will be issued $6,000,000 10-year 7½ per cent. bonds which have been underwritten and will shortly be offered to the public, $9,500,000 8 per cent. preferred and 187,000 shares of common. The owners of the constituent companies receive only stock in payment, and no company enters the combination unless net assets are three times liabilities. An early offering of $3,500,000 preferred is contemplated by Chicago banking houses.

Rolling Library at Convention

Librarians who have gathered at Detroit for the national convention of the American Library Association are being met with striking suggestions which will materially increase the use of library facilities in farm communities. A complete portable library, which is used in carrying books to the farmer, was displayed. It consists of a Dodge chassis on which is mounted a body fitted with racks which carry several hundred volumes on a great variety of subjects. The traveling library is used to circulate books among the rural population surrounding Noblesville, Indiana. The car is a great favorite among the farmers and their children, who look forward anxiously to its arrival as it makes its regular trips through the countryside.

The library car is operated by the Public Library of Noblesville, and was lent for a week at the urgent request of the American Library Association. "Pegasus," as the library car is called, was selected to illustrate an excellent plan of increasing the public library's range of usefulness in every community.

The car was easily constructed by a little cabinet work on a standard chassis. Plenty of carrying space is provided in the interior, and the books are neatly ranged on racks with the titles facing on the outside. The portable library has aroused a great deal of favorable comment among librarians at the convention.

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Freight Rates Discriminate Against Motor Products

By H. H. BABCOCK
President, H. H. Babcock Company

THE tendency on the part of law-making and rate-making bodies to single out the automotive business to bear a disproportionate burden is pronounced and dates back to the early days of the industry when it was the habit to regard the motor vehicle as the plaything of the idle rich. Notwithstanding the growth of the industry to its present huge proportions and the evolution of the motor vehicle from a toy to a vital necessity to the whole business of the nation, this attitude still persists and we find Congress continuing to impose an excise tax on the manufacturer of motor vehicles after the other excise taxes, bred by necessities of war, have been removed, except in the case of such luxuries or non-necessities as cameras, firearms, sword-canes, cigarette-holders, yachts and riding-habits. The grouping of automobile and motor trucks in this category is a fair sample of the tenacity of the human consciousness in clinging to ideas long since outgrown.

It is my desire briefly to outline how this mental attitude toward the motor vehicle is discriminating to-day against the products we are making in the matter of freight rates. It was natural in establishing classifications to cover such new-fangled contraptions as the first automobiles were generally regarded, to fix a high tariff, but I have been unable to find any case of a reduction in rates on automotive products.

Probably in certain instances commodity rates have been established to reduce obvious inequalities between favored or influential districts, but certainly no reduction in the general classification has been made to an extent demanded by the growth in volume and importance of the products in question. It is equally obvious that until we, who are the parties most interested, bring a concerted attack upon the present system, there is little prospect of relief from the inequalities which we have thus far borne with only an occasional grumble among ourselves.

Most of us are specially interested in what is known as the "Official Classification District," which comprises, roughly, that section of the country west of the Mississippi and north of the Ohio River. For the sake of convenience I shall base the comparisons I mean to make on the freight rates from Watertown, New York, to Detroit, Michigan, a distance of 622 miles, which will serve as a fair example of the rates prevailing throughout this section of the country.

In making my comparisons with freight rates on other commodities, I have selected horse-drawn carriages, horse-drawn hearses, and farm and lumber wagons, as the most nearly analogous to bodies for automobiles and trucks. It should be borne in mind in considering these comparisons that the units on which freight classification is based consist of value, bulk, weight and liability to damage, cost of handling, and the value and volume of the traffic.

Let us first consider the comparative rates as they apply to passenger-car bodies (which include 'buses, hearses and ambulances) on the one hand, and horse-drawn carriages (including surries and hearses) on the other hand. Passenger-car bodies crated set-up over 36 inches are four times first-class with a minimum weight of 1,000 pounds; carriages over 54 inches three times first-class with no minimum weight; hearses double first-class with minimum weight of 4,000 pounds.

In carload, such bodies, loose or crated, take first-class with a minimum weight of 10,000 pounds. Carriages or hearses, loose or crated, take second class, with the same minimum weight. A lower classification applies to passenger-car bodies crated K. D. under 36 inches, but as no one is making such a body, and it is doubtful if we ever shall, it is needless to consider this classification.

The freight rates from Watertown to Detroit are, first class $1.15, second class $1.02. Assuming that the crated passenger-car body weighs 1,000 pounds, which is the stipulated minimum weight, the L. C. L. freight from Watertown to Detroit would be $4.60 per 100 pounds, or $46.00 per body. Against this the shipment of a fine surrey, which would be a fair comparison to a high-grade passenger-car body of the same weight, would cost $34.50, or over 25 per cent. less than the car body of approximately the same value, bulk, liability to damage, and cost of handling, whereas the value and volume of traffic would be to-day greatly in favor of the car body. If the automobile body weighed 500 pounds it would still cost $46.00, against $17.25 for a surrey of equal weight.

A horse-drawn hearse, if set up on skids or dummy wheels, takes double first class with no minimum weight, and would cost to ship to Detroit $23.00 as against $46.00 for a motor hearse body of like weight and value. A carload of passenger-car bodies from Watertown to Detroit costs $115.00 as against $102.00 for a carload of carriages—about 12 per cent. more.

Turning to truck bodies and comparing them with farm and lumber wagons, the former (including the flare-board express bodies, cab tops, platform truck bodies with their equipment, and the cheaper grade of panel bodies, all of which can be knocked down under 34 inches) take one and one-half times first class as against farm and lumber wagons at first class. In carloads truck bodies go at second class rate, with a minimum weight of 10,000 pounds, whereas farm and lumber wagons carry a fifth class rate with a minimum carload weight of 20,000 pounds. Rate from Watertown to Detroit, first class, is $1.15; second class, $1.02; fifth class, 46 cents. The most popular type of our platform body and equipment, with loading space 6 feet by 12 feet, weighs 1,650 pounds, and costs L. C. L. Watertown to Detroit $28.46. The same weight in farm wagons can be shipped from Watertown to Detroit for $18.97, or about 40 per cent. less.

A carload of heavy truck bodies weighing 10,000 pounds would cost $102.00 as against $92.00 for the same weight of farm and lumber wagons. We can easily get in a solid carload of these freight bodies 20,000 pounds, which would cost $204.00 as against $92.000 for the same weight in farm and lumber wagons. On inquiry I find that the average weight per unit in a mixed carload of farm and lumber wagons is 1,025 pounds, and an average per car of 20 units, which brings the shipment up to the minimum of 20,000 pounds per 36-foot car. In other words, it costs over twice as much to ship a full carload of motor truck bodies to Detroit as it does to ship a solid car of farm and lumber wagons.

Turning to the more expensive type of panel bodies, in which we specialize, and which are usually shipped set up, we find that these bodies take four times first class with a minimum of 1,000 pounds, as against a set-up carriage or surrey, which takes three times first class with no minimum weight. A popular model of this type of panel body carries a gross weight of 670 pounds, and costs us to ship to Detroit $46.00 L. C. L. A surrey weighing 670 pounds would cost $23.11, or one-half as much. In this connection it is interesting to note that the express charge from Watertown to Detroit on the same body is $51.45 as against $46.00 by freight.

Although the rates discriminate against set-up truck bodies and cabs as against horse-drawn carriages and surreys, the rate on both commodities when crated under 34 inches is the same. This is the only case I have been able to discover of a departure by the rate-making authorities in their otherwise consistent attitude of discrimination against automotive products.

An interesting comparison can be made between the classifications covering passenger-cars (including the chassis) and a horse-drawn hearse on gears. Without going into the rates L. C. L. and carload, it is sufficient for our purpose to state that a horse-drawn hearse on gears weighing 2,500 pounds would cost $46.00 as against an automobile of the same weight $57.50. Or taking the weight of the horse-drawn hearse at 5,000 pounds, it would cost $115.00, as against an automobile of the same weight $143.75. A carload shipment of horse-drawn hearses would cost $102.00 as against $126.50 for a carload of passenger-cars.

Comparing motor trucks with or without bodies to harvesting machinery such as mowers and reapers, a small truck weighing 2,000 pounds would cost $57.50 L. C. L., and a large truck weighing 5,000 pounds would cost $86.25; whereas, a reaper whose average weight is 1,600 pounds, would cost $36.80. A carload of motor trucks would cost $122.50 at a minimum weight of 12 000 pounds, whereas a carload of harvesting machinery would cost $110.40, with a weight up to 24,000 pounds.

It is not the purpose of this paper to go exhaustively into the matter of freight rates and I have omitted any attempt to analyze

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Transportation Engineer Badly Needed in Trucking

By EUGENE W. ROESCH
Transportation Engineer, New York Edison Company

DURING recent years the word "efficiency" has been so often employed that it has wellnigh become the bugbear of business executives. The efficiency expert has invaded the commercial word, too often without a clear sense of his duties, and in many cases has, unfortunately, merely succeeded in getting himself disliked, particularly when dealing with those whose education by study of the printed page has not kept pace with their acquisition of knowledge by experience. It must not be inferred from this that an attempt is being made to discountenance the efficiency expert. On the contrary, the efficiency expert who is thoroughly acquainted with the needs of his profession and who is allowed to work unhampered by bungling interference is a valuable and necessary adjunct to any industry, and is one whose services can not be economically dispensed with. While this is true of any business or industry in the country, it is uniquely and particularly applicable to the motor truck field.

There is a very definite and urgent need for a special type of efficiency expert in the motor trucking industry; that expert is the transportation engineer. In 1920 the number of revenue tons of freight carried one mile in the United States was 409,970,656,000 and from this enormous tonnage an operating income of $6,225,442,762 resulted. Although these figures apply to railroad traffic, it is apparent to anyone that they necessarily involve the motor truck. Freight, before it can be placed in railroad cars, must be taken there by trucks, usually motor-driven, and again, on its arrival at a designated spot, it must be delivered to the consignee. In these operations the motor truck has taken its place as the most important factor, a place which it has rightfully won by its efficiency and performance. Tho motor truck industry has increased its production to keep pace with the growing demand until from 411 trucks in 1904 the output grew to 322,039 in 1920. The aggregate wholesale value of the 1920 production was $423,756,715 while the total number of motor trucks in service throughout the country during that year was 945,826.

Passing from an industry of such magnitude to the individual application of that industry's product, we come upon the person, firm, company or corporation using motor trucks for the transport of material. And here, confronting us, is the opportunity and the need for the transportation engineer. It is not an exaggeration to state that three quarters of the motor truck owners in the large cities throughout the United States have not the faintest realization of what their trucking costs actually are. In most cases the owners have neither the time nor the knowledge necessary to arrive accurately at such cost totals. Business exigencies and the routine of everyday commerce claim their attention and it is scarcely possible that they should be familiar with all the elements which enter into a summary of motor truck operation costs. These same business men who own motor trucks would not attempt to go into their bookkeeping departments and instruct the clerks as to how the accounts should be kept. Neither would they strike their own monthly balance sheets but, instead, would, and do, have a public accountant take care of the matter, paying for the service just as they would pay for a parcel of goods on delivery. The same sort of need, that exists for a public accountant, exists for the transportation engineer.

In many industries the cost of operating motor trucks approximates 15 per cent. of the total income. Such an item, when realized, is sure to demand attention. The transportation engineer is the man who, when the purchase of trucks is being considered, is called upon to investigate the situation and then give his opinion as to the size of motor truck required, the type of body necessary for the job, the best routing arrangements, etc. Naturally it is vital that he be in harmony with the manufacturer and the body-builder or failure to coöperate will result. In the cases where motor trucks are already being operated the work of the transportation engineer is most important. Only by a study of conditions can losses and unnecessary expenditures be detected and the practice, obtaining in some concerns, of allotting so much of the income toward defraying trucking expense is to be decried. Doing so brings no accurate knowledge of what the various items cost and a proper basis for future purchase and operation is rendered impossible.

The installation of daily truck operating cost systems should also come under the supervision of the transportation engineer, whose experience and practice have fitted him to make the best recommendations in such instances. So many factors enter into the problem of keeping motor truck operating costs that I have attempted to tabulate them and have arranged them in the following order which is not meant to list them according to importance but strives only to set down the various elements:

Cost of chassis.
Cost of tires.
Cost of body.
Cost of equipment.
Cost of battery (in electric trucks).
Battery rental or renewal allowance.
Battery repairs (in electric trucks).
Helper's wages.
Mechanic's wages.
Driver's wages.
Overhauling.
Painting.
Repairs.
Time lost on road.
Overtime.
Extra vehicle rental.
Interest.
Depreciation (complete).
Insurance (complete).
Gasolene.
Electricity (in electric trucks).
Grease.
Oil.
Kerosene.
Distilled water.
Cleaning waste.
Garage rental.
Interest on building (when trucks are kept in own structure).
Total taxes, including licenses.
Days operated.
Days idle.
Days maintained.
Miles covered.
Trips made.
Total weight carried.
Average commercial ton-miles.
Average weight carried.
Average distance per trip.
Average distance operated per day.
Average miles maintained per day.
Cost per day operated.
Cost per day maintained.
Cost per mile operated.
Cost per ton-mile.
Total miles.
Total expenses.

In order to keep the foregoing items up to date in some businesses a small army of assistants would be necessary and in most cases the volume of business done does not warrant the outlay. However, it is always possible to call in the transportation engineer just as the public accountant is called in on the first of the month, and a full statement of affairs could be arrived at.

In view of the foregoing it will be seen that the necessity for the transportation engineer is really present and were his services to be employed in many instances instead of comparatively few, as is now the situation, the savings which he would be able to effect would more than justify his presence. The transportation engineer should be thoroughly conversant with the work to be undertaken, as he usually is, and should be extremely careful not to arouse adverse criticism or ill feeling. Coöperation between the transportation engineer, the manufacturer, the body-builder, the purchaser and the truck driver should be the end toward which all strive. Were this always the rule, a dissatisfied motor truck owner would become the extreme rarity and the entire industry would benefit.

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the established rates on automobile and body parts as against rates prevailing on similar articles of other descriptions. I have felt that my aim would be accomplished if, by the recital of a few glaring cases of the discrimination of which we are the victims, the trade could be convinced that some united action on our part is a vital necessity to the securing of remedial action, and I hope that the facts I have presented may serve as the basis for further discussion and appropriate action.

Vehicle Shipments in June

Shipping reports to the National Automobile Chamber of Commerce, 90 per cent. complete, indicate that June shipments reached a total of 33,000 car-loads, 30,500 driveways, and 7,900 boat deliveries. On this basis it is estimated that 271,022 passenger-cars and trucks were produced by all makers in June, an increase of 6 per cent. over May and 51 per cent. over June, 1921. Last year June production increased 9 per cent. over May.

The factory shipping figures for all manufacturers are:

	Carloads.		Driveaways.		By Boat.	
	1922.	1921.	1922.	1921.	1922.	1921.
Jan.	15,357	6,485	7,479	3,185	143	93
Feb.	19,636	9,986	10,173	7,507	180	99
March	27,753	16,287	16,917	9,939	560	75
April	31,334	20,187	22,381	14,197	2,960	1,619
May	34,324	18,608	28,760	15,193	7,366	2,381
June	*33,000	20,269	*30,500	18,834	*7,900	3,947

*Partly estimated.

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Delivery Costs Need Control

By HAROLD B. WEISSMAN
Industrial Engineer, R. H. Macy & Company, New York

THE misfortune is, that in a retail establishment, the delivery department is considered as merely a department. We are apt to forget that in reality it is a trucking establishment. We could even go so far as to take that department out of the store and operate it as an independent trucking business. As an independent business its function is what? It does not manufacture an article, but it manufactures something much more valuable, and that is, service.

As a business, it should be operated for the same reason that every business is operated—for a profit.

The real test is the answer to this question: "Would the department, operated as a separate business, give a return on the investment in the business?" Or, to ask a fairer question, "Can the service rendered now by the delivery department be secured at a cheaper cost outside the department?"

The only difference between the department as an independent organization, and the department as a delivery department in a retail organization, can easily be shown. In the former case, we would attempt to operate so efficiently as to render service at the minimum cost to the business, as well as at the minimum charge to clients, compatible with competition in the field. In the later case, we would operate the business so efficiently as to conduct it at a minimum cost, resulting in a minimum charge to the selling departments.

Unfortunately, as is very often the case, finding the cost is considered the final goal. Finding the cost for cost's sake, gathering statistics just for the purpose of gathering statistics, is a waste of effort. Our information should be a motivating force in the business, and not an interesting set of data which that so-called, mysterious office "gets up." Unless these figures are reliable, accurate, and constantly employed by the heads of the delivery and garage departments, by the general manager, and by members of the firm in their councils, in their plans, and in their daily decisions, we fall short of having a real compass in our business.

If we are to eliminate waste, if we are to be guided in the efficient conduct of our business, we must not only find the cost, but we must be able to account for it, and in the last analysis, control it. Therefore, the purposes of this article shall be:

(1) To show how we can find our cost accurately, and at the same time, uniformly, enabling us to use it effectively in our own business, as well as facilitating comparison among ourselves, thus benefiting by the experience of others.

(2) To account for the barometric changes in cost.

(3) Finally, to apply a bit of prevention to our own business. Use this information to help us control the cost, and not be unhappily surprised at the end of the season. Guide our various decisions and plans in our daily work, so as to keep the cost within the low limits previously standardized and demonstrated.

In finding the cost we must be sure that we have taken into consideration every item of expense chargeable to delivery, as a delivery expense; otherwise, we are liable to delude ourselves by a distorted and inaccurate delivery cost. As a gage, whether we have included every phase of expense, we can bring to our assistance the very thorough classification of expense developed by the Controllers' Congress of the National Retail Dry Goods Association. They have found what they call the "Natural Divisions of Expense" as follows:

(1) Salaries and wages.
(2) Rentals.
(3) Advertising.
(4) Taxes.
(5) Interest.
(6) Supplies.
(7) Service purchased.
(8) Unclassified.
(9) Traveling.
(10) Communication.
(11) Repairs.
(12) Insurance.
(13) Depreciation.
(14) Professional services.

If every business included these 14 classes of expense arising from the delivery operations, we would at least be certain of one important fact—that we are all guided by the same principle in compiling our delivery expenses.

I HAVE taken the liberty to combine the excellent advantages offered by this natural classification of expense of the Controllers' Congress, with the thorough classification of delivery items tentatively proposed by the International Delivery Association. If on, the one hand, we maintain this natural classification of expense and if, on the other hand, we bear in mind the classification of delivery functions, such as internal or shipping-room, external delivery, divided into stable and garage, and finally depots, we can so organize our expenses as to know exactly what salaries, rentals, taxes and interests cost us, not only in toto, but for each of the functions of the delivery department. Thus shall we have a uniform cost system which will not only enable us to make interesting comparisons, but will also assure us of the following:

(1) That we have charged to delivery everything that should be charged to delivery.

(2) That we can at any time know the total monthly or seasonal cost of any one of the 14 classes of expense, such as the total cost of interest, of taxes, of rentals, the total salary cost of delivery, the total traveling expense, insurance, depreciation, supplies, the total outside services purchased, etc.

By following this arrangement, we will know more than the total salaries for delivery. We ought to know the salaries for the internal delivery, for our external delivery—both for garage and stable, individually—and the salaries for each of our depots. Similarly, any one of the 14 items of expense will be known to us in toto, as well as for each of the functions of the delivery department.

TAKE Expense No. 11—Repairs. Under this classification, we shall know our total cost of repairs. We shall also know the total cost of repairs for the garage, and for the stable, individually. Take item No. 6—Supplies. We shall have the total cost of supplies and also the supplies consumed by the internal delivery, by the external delivery, and by the depots. These items, I hope, will make the individual small units of expense more specific.

It is, therefore, interesting to note that from the gross total of expense we can secure:

(1) Subtotal of expense for each one of the 14 classes of expense, and we can also get for each kind of expense such as salaries, rentals, taxes, that particular expense, either for internal delivery, external, or the depot.

(2) By getting together all the 14 classes of expense for internal delivery, we can get the gross expense for internal delivery, and know what the shipping-room costs us.

(3) By getting together all the 14 classes of expense for external delivery, we can know exactly what our external delivery costs us, and particularly what all the garage operations cost us, and the stable, and, similarly, the depots.

(4) We can go down even to a smaller basis, and under the natural classification of expense, called salaries, we can take the particular item of expense of mechanics in our garage, in external delivery, and we shall know exactly what our labor for the care of machines costs us. And if we follow the delivery classification of garage all the way across that chart, we shall find further items of expense that apply just to our vehicles.

In this article I am not going to enter into the details of gathering cost information, except to outline briefly the method that may be followed: Every invoice should be dissected and marked with three classifications:

(1) The part of delivery to which it is chargeable—internal, external (garage or stable), or depot.

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(2) The main heading of expense. Any one of the 14 classes of expense to which this particular item of expense belongs.

(3) Any subclassification. It may be of interest to keep a particular record of stationery costs. Therefore, in addition to the main heading, "internal supplies," the bill, or the particular item on the bill, should be marked "stationery." When it is thus entered for a specific week of the season, in the main classification "internal delivery," under the heading of "supplies," we have at once a cumulative and current record that will give us the cost of stationery in toto, as well as for internal delivery. At the same time, this item goes toward making up the major expense supplies.

If every one of our items in expense is marked on the invoice, voucher, or pay-roll sheet, in this uniform method, viz., delivery classification, natural expense classification, and then particular classification, we are certain of having an accurate record of the cost, charged properly to the various classes of expense and to the various branches of the delivery department. We shall, in addition, be following uniformly the same method, so that, if we should desire to compare our items, either on an actual dollars and cents basis, or on the percentage basis, they would have the same meaning in each organization.

At this point I can not too strongly stress upon the reader the importance of the realization that each organization in this age can no longer morally stand alone. In the last analysis, we all owe an obligation to the community, to the country—of operating and conducting our business so efficiently as to help maintain industrial stability. I not only strongly urge that some thorough system of cost-keeping be adopted for the sake of efficient control, but that such a system be uniform, to give a common medium of expression. Generalities will not do the trick. We must learn to be more specific. We must learn to talk in terms of dollars and cents. We must learn to talk in terms of specific results and, to do so, we must have information.

THUS far I have dealt with expense in a general way, by using the classifications proposed. By following some such method as outlined, the reader will be able to arrive at expense in the gross, and in any one of the 14 classes of expense for internal delivery, external delivery and depots. It will also enable the reader to know the total expense for any week, month or season, of any specific item under any one of the 14 classifications of expense.

After we have this information, what are we going to do with it? Suppose one does not know what labor cost is for internal delivery, for the garage, stable and depot. Suppose one does know what labor cost is specifically for entry clerks, for sorters, for messengers, for drivers, for helpers, for mechanics. Suppose one knows what one's repairs cost. What help is that going to be? All the service it will render is to know what to charge to the selling departments. That is the amount spent on delivery, and that is the cost of service that the selling departments must stand. Has it any other value? This is what I meant when I mentioned the interpretation—the accounting for the cost.

If this information is to mean anything, if it is to help the managers of delivery departments, the manager of the store, the executives of the firm, to interpret the work being done by the delivery department, we must go a step further. We must set up machinery that will give such interpretation. We must be able to explain why a certain item of expense has risen or fallen.

I know quite well the method unfortunately often adopted. It has either one or two aspects:

(1) The heads of the department are called in, told that the delivery expense has risen, put on the mat for it, and that settles the matter until the next report is received.

(2) Discussion ensues on the subject, there is shrugging of the shoulders by all concerned, and a general remark made as to the rise in the cost of living, the rise in prices, and the matter is settled. Whether the rise in prices is wholly due to the increase in the cost of operations is not considered, because the facts are not available. There is no way to establish it. Whether the increase in the cost of operation in the department is the fault of the department is not determined. Very often the department is not to blame. There are other reasons. If the cost fails to go down there may be other reasons than the fault of the department. The cause might easily be remedied if we had the facts.

What further information should we have in order to be able effectively to shed light on our cost facts? To begin with, let us analyze the factors that control cost. They are divided, firstly, into two main branches:

(1) External factors—resulting from conditions outside the organization, such as business conditions of the community or the country as a whole.

(2) Internal factors—conditions arising within the organization.

I shall not, in this article, go into any details in the case of the external factors, as that is a very large subject. It does not affect the discussion except that we hope every organization manages to maintain an accurate index to economic conditions in the community, in the particular industry, and in the country. Not an index in a general, but in a specific, way; not as an isolated, interesting study of economic conditions, but as a closely correlated study, directly linked up with the specific effects that the fluctuating external conditions have on the internal conditions of the organization. With such facts we should be able to know whether our increase in the amount spent on supplies is wholly due to the increase in the cost of supplies per unit, or due to the inefficient use of such supplies—the parts attributable to one cause or the other. We are immediately interested, however, in the internal conditions that control cost. They are mainly:

(1) Quality of production.

(2 Quantity of production.

(3) Efficiency of equipment, determined by

(a) Cost of repairs.

(b) Cost of maintenance.

(c) Production per machine.

(4) Maximum use made of equipment, determined by idle time.

In the factory we measure production by the number of units of work produced by a man-machine, per hour, or per day. After all, the cost per article produced is largely determined, in addition to the initial cost of material, by the amount of human and machine energy needed to produce the article. If, for example, it costs a dollar per hour to operate a machine, and a dollar per hour for the operator, two articles produced per hour will be charged with a dollar apiece. If four articles are produced per hour, each article will be charged with 50 cents. In the last analysis, therefore, returning again to delivery, the expense must be measured in terms of production. In delivery, we produce a different kind of article, and that is, the specific service of taking a package from the store and handing it, in good condition, to the customer at her home. The energy consumed in the handling of the package is:

(1) From the time it reaches the delivery to the time it is on the wagon, and this we know as internal delivery.

(2) From the time it was placed on the wagon to the time it is brought to the customer.

(3) The additional energy or expense involved in finally disposing of our service in internal delivery, either by the return of the package, or by the return of evidence that the customer has it.

WE MUST, therefore, establish an accurate method of pitting cost against production. We have thus far shown how we can measure the cost. We must now be sure that we will have the following understanding of production, so that we may interpret the cost in terms of production, and production in terms of cost.

What must we know about production?

(1) Production in the gross, that is, the number of parcels delivered for a day, for a week, for a month, and for a season. Having the cost, we should know what it costs us to deliver a package either daily, weekly, monthly, or seasonally.

(2) That will only give us the cost. We are, however, interested in the explanation of the cost. The cost per package will depend on the same principle as the cost per piece. Just as the cost per piece was determined by the number of pieces produced, per machine-hour and man-hour, so the cost per piece will depend on the number of pieces delivered per machine and per man. Our machines per day costs us so much in specific overhead—depreciation, interest on the investment, rental, heat, light, and power, salary of the chauffeur, wagon boy, the constant wear and tear which involves repair, etc. This machine costs us that amount whether it is delivering 100 or 200 packages. The driver's salary is the same whether he delivers 100 or 200 packages, and the helper similarly.

Our aim, therefore, must of necessity, be the kuowledge of the production per man per vehicle day. I am not implying here any standard at all. All that we want to know is the production per vehicle day per man. It stands to reason that, if we should find that one season our cost for delivering per piece has increased and, at the same time, discover that the number of pieces delivered per man per vehicle day has de-

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creased, we have at least one reason for the increase in the cost per piece. There may be others, but this is one of which we are sure. Why has the number of pieces per man decreased? Why has the production decreased? That is another matter. Herein is the danger of statistics. They may be interpreted incorrectly and reflect, as has often been the case, on the statistics themselves, when the fault lies in the interpretation. There may be many reasons why the number of pieces per vehicle day has decreased. It may not be the fault of the driver, although we all know that during the war the efficiency of labor decreased. That, however, may not be the only reason. It may be due to some fault in the method of assigning loads. It may be due to the fault of the method of combining loads. It may be that the delivery has not so organized its routes as to be able to give a very efficient driver a large load, a load that he can very easily dispose of, and give an inferior driver, who naturally is incapable of delivering a large load, a smaller load, one that he can carry.

HOW often did we find that in the office and in the factory it is the inefficient man, the man who is naturally slow, who sets the pace? That may be a good reason why production decreases in the department. It may be that we have a few slow men, and all the other men, finding that the slow man receives the same salary, the same reward, adopt the pace of the slow man, and production suddenly takes a slump. It can easily be seen that when such a condition comes into existence, the cost per unit must go up—the cost per package increases. If we know these facts, however, we can easily diagnose the disease and find a remedy.

In establishing production records, I believe it is advisable to begin with the smallest unit—the working basis—and that is the load. Every load leaving the house should have something to represent it—a card or some form that will take the place of the load. It should give us all there is to know about the load—the name of the man, his helper, where he went to deliver, the number of pieces he took with him, the number he returned and similar information.

The flexibility of such a system is most surprising, as it can be used to get all sorts of valuable information. For example:

(1) Cards arranged by driver will give a record of production per driver.

(2) Cards arranged by zones (a combination of routes, a specific section of the city) will give a record of the total pieces delivered per zone. Thus the intensity of business done in each section of this city is shown, which will enable one ultimately to determine what it costs to deliver a package in each section of the city.

(3) Cards arranged by car numbers will give a record of all the cars that were in operation during the day, taking also the production per car.

(4) Cards arranged by routes, i. e., if information is properly organized, can picture exactly the manner in which the loads were made up during the day.

One ought to know for each day, week, month or season the following:

(1) The number of pieces delivered in each zone.

(2) The number of pieces carried by each vehicle.

(3) The number of pieces carried by each driver, whether with one or two helpers. That will give an index to the drivers with high production, and those with low production. Of course, the information is not so valuable as when one has standards of production for each zone and for each month of the year.

(4) Returns by zones, so that an accurate control over those returns can be obtained and the trouble located—concentrating efforts in that direction.

(5) How the loads are made up daily.

I am afraid that I must write here a word of warning. The practical men in this field, the men who have become part and parcel of it, may feel that all this is unnecessary, and in a sense, they are justified in their attitude. After all, they have operated their businesses, and done their best without all these records and "red tape." After all, is it not the personal element that really counts? The man in charge of the garage—does he not know each car? Does he not know each driver? Does he not see that everything runs smoothly each day? The man in charge of the delivery—he keeps his eyes open, he knows what is going on, he can almost touch the problems in his department blindly. True! That was the case years ago, even with the merchant, when business was small, when business was operated on a smaller scale. He had no need for the so-called "red tape," for accurate cost records, for statistics, for accountants, for engineers. He had everything on the "tips of his fingers." He could point to this or that, with a knowledge of every detail.

But the reader must remember that just as business has increased, just as the retail store has often become a multiplicity of retail stores, so has the department increased in the same proportion. It is now almost humanly impossible for any one man, unless he operates a small division, to be in close touch with every detail. Today it is necessary to create certain artificial controls for business. I repeat that the natural control is the best. The time when the employer and employees rubbed shoulders was the most congenial and conducive to a proper understanding for both, but on account of the rapid growth of industry, that, unfortunately, is impossible. Therefore, we must create these artificial means, these cost systems, these statisical data, to take the place of this personal contact with every detail in the business—a very poor substitute to be sure, but yet, at least, a safe substitute.

HOWEVER, even if one, with all the growth of the business, could find it possible to carry all the details of the department in his head, to know all about it without records, one must still remember that the management and the executives, have no means of close contact with all such details. When they discuss store policy, store improvements, consider the question of costs, the question of plans for the future of the business, try to understand and to measure the operations of each department, they must have some common language. They have no other basis of talking of the department except through the medium of the cost and production records. There is only one common language between department heads, management and the firm, and that is the medium of facts and figures of production and cost per unit production. The more accurate this information is, the more comprehensive it is, the fuller will be the understanding between department heads, the management and the firm. I wonder whether it is realized how much friction is caused in the average organization because the manager calls his department head down for matters on which he, personally, has not the full facts. He tells his department head to do this and that when he has no adequate basis of measuring, of determining whether his charges are right or wrong.

IN AN organization where the motto is "What are the facts?" managers, firm and department heads sit down to discuss, not on the basis of personalities, not on the basis of personal prejudice, but on the basis of the facts available. Just as in the relationship of management and department heads, there will be a smoother working organization when their dealings are based purely on facts, so it will be between management and labor. All the misunderstanding, all the discontent, all the friction between management and labor is due to the same reason that friction is created between management and department heads, and that is a lack of facts, a lack of accurate facts, a lack of proper interpretation of facts.

We now turn from the consideration of production to the matter of equipment. There is a certain amount of information absolutely essential if we are to be in a position to interpret and to control cost. Each organization has developed thus far to a point where it realizes that employees can not be treated in the mass that one employee differs from another in temperament, in natural ability and in particular leanings. A history of each is kept.

Is it not peculiar that in a fleet of one hundred or more vehicles, in each of which we make an original investment of from three to five thousand dollars and, during the year, we invest hundreds of dollars in repairs and maintenance, that we should not take the same interest in that individual vehicle as a unit? Suppose our cost suddenly increases, or it does not decrease as it should: Can we immediately locate the fault and say "This is the trouble?" If, however, we maintain a history of each vehicle, from the time we purchase it, to the time we sell it or scrap it, we are in a position to know.

How many days each season is the vehicle idle? How many days is the vehicle laid up in the shop for repairs? It is generally admitted that one type of vehicle is better suited for retail delivery than another. How are we to determine that unless we keep accurate costs and records of performance?

It is very easy to maintain such records. The mechanic should submit at the end of each day a work ticket on which he will indicate the number of hours spent on each car, the work he did, and the amount of material he used for that car. The cost of labor should be charged against that vehicle, classified under the items inspection, washing, work on the body, running gear,

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motor, engine, or painting. The car should be charged with all the material used on the body, running gear, motor, engine, or in painting, etc. The charge of gasolene and oil consumed every day, as well as tire per mile, on a mileage basis, should also be added. It is necessary to know the cost to date in repairs, and its relation to the original cost of each car. Thus, a history of the car is easily maintained. One should have the same information about tires.

It would not be considered good business to run and operate a factory without an absolute control for each machine. It is necessary to remember that cost will be determined by the efficiency of the machine, the vehicle and by the efficiency of labor. I have shown the importance of production in determining cost. It is now essential to point to the value of knowing each vehicle thoroughly. In addition to having the cost of repairs per mile, we should also know the cost of maintenance of that vehicle per mile. If we should plan to bring cost down, or explain why it took a sudden jump, an examination of the history of each piece of our equipment would help us.

Can you imagine what a wealth of information would be available if such accurate histories of vehicles and equipment were maintained? If we combined all such information and experiences, we could do much toward learning to operate most efficiently.

(1) We could determine the best type of vehicle to be operated most cheaply for retail delivery.

(2) We would know accurately, and not by guesswork, exactly the kind of territory best suited to certain types of vehicles.

(3) We would know which policy of repairs was the soundest and cheapest.

(4) We could easily determine the advisability of scrapping vehicles, so that we would not sink money into vehicles after the law of diminishing returns had set in, after a point when the vehicle ceased to return enough for the investment sunk into it.

This is what I meant by "controlling the costs." It is one thing to find the cost; it is another to interpret it; but the ultimate goal should be to control it.—*Administration.*

Dump Body for Fords

The Griscom-Russell Company, New York, announces that it has placed on the market a new dump body for Ford trucks to be known as the Jiffy dump body.

Both construction and operation are very simple. A distinctive feature is the scale balance support, which means that there is no hoist and that the body dumps automatically upon releasing the locking device. The driver can operate the Jiffy body from the driver's seat without stopping the truck. In dumping, the driver releases the locking device and the body automatically tilts until it reaches the 45° angle, when the tail-gate automatically opens and the load dumps. The tail-gate can be arranged to spread material to any desired thickness on the road, while its double-acting design allows change to an express body. The scale balance support is about 5 inches in front of the rear axle, giving a good distribution of the load on the chassis.

Changes in Truck Prices

The following changes in the prices of truck chassis have been made effective since November 15 of last year:

Model.	Old Price.	New Price.	Reduction.
Acason, 1½-ton	$2,485	$1,950	$535
Acason, 2½-ton	3,295	2,750	545
Acason, 3½-ton	4,295	3,450	845
Acason, 5-ton	5,250	4,350	900
Autocar, 1½-ton	2,300	1,950	350
Autocar, 3½-ton	4,350	3,950	400
Beck, 1½-ton	2,050	1,725	325
Beck, 2-ton	2,150	1,810	340
Beck, 2½-ton	2,850	2,395	455
Bessemer, 1-ton	1,395	1,795	400*
Bessemer, 1½-ton	1,995	2,395	400*
Bessemer, 2½-ton	2,595	2,895	300*
Bessemer, 4-ton	3,495	3,695	200*
Brockway, ¾-ton	1,675	1,590	85
Collier, 1-ton	2,150	1,850	300
Collier, 1½-ton	2,550	1,950	600
Collier, 2-ton	2,850	2,150	700
Collier, 2½-ton	3,450	2,345	1,105
Columbia, 2½-ton	2,850	2,335	515
Commerce, 1½-ton	2,050	1,695	355
Corbitt, 1-ton	2,200	1,480	720
Corbitt, 1½-ton	2,600	2,200	400
Corbitt, 2-ton	3,150	2,600	550
Corbitt, 2½-ton	3,300	3,000	300
Corbitt, 3½-ton	4,100	3,800	300
Corbitt, 5-ton	5,000	4,500	500
Denby, ¾-ton	1,625	1,485	140
Denby, 1½-ton	2,300	2,145	155
Denby, 2-ton	2,600	2,395	205
Denby, 4-ton	4,200	3,895	305
Denby, 5-ton	4,850	4,295	555
Denby, 7-ton	5,500	4,945	555
Dodge, ½-ton (panel body)	1,135	980	155
Dodge, ½-ton (screen body)	1,035	880	155
Duplex, 3½-ton	4,450	3,700	750
Ford, 1-ton	445	430	15
Fulton, 1-ton	1,750	1,495	255
Fulton, 2-ton	2,350	1,985	365
Garford, 1¼-ton	2,090	1,990	100
Garford, 2-ton	3,190	2,750	440
Garford, 3½-ton	4,390	3,750	640
Garford, 5-ton	5,200	4,500	700
Garford, 7½-ton	5,500	5,200	300
GMC, 1-ton	1,495	1,295	200
GMC, 2-ton	2,775	2,375	400
GMC, 3½-ton	3,950	3,600	350
GMC, 5-ton	4,350	3,950	400
Graham, 1-ton	1,370	1,265	105
Graham, 1½-ton	1,430	1,325	105
Gramm Pioneer, 1½-ton	2,050	1,900	150
Gramm Pioneer, 2-ton.	3,175	2,925	250
Gramm Pioneer, 3½-ton	4,375	4,225	150
Gramm Pioneer, 5-ton.	5,275	4,895	380
Hahn, 2-ton	2,225	2,275	50*
Harvey, 2-ton	2,950	2,650	300
Harvey, 2½-ton	3,300	2,950	350
Huffman, 1½-ton	1,995	1,795	200
Indiana, 2-ton	2,985	2,685	300
Indiana, 2½-ton	3,375	2,985	390
Indiana, 3½-ton	4,085	3,875	210
Indiana, 5-ton	4,825	4,500	325
International, 1-ton speed	1,500	1,250	250
International, 1-ton	1,750	1,550	200
International, 1½-ton.	1,850	1,650	200
Kalamazoo, 1½-ton	2,495	1,800	695
Kalamazoo, 2½-ton	3,700	3,350	350
Kearns-Dughie, 1-ton.	1,600	1,150	450
Kearns-Dughie, 2-ton.	2,200	1,650	550
Kelly-Springfield, 1½-ton	2,900	2,700	200
Kelly-Springfield, 2½-ton	3,250	2,900	350
Kelly-Springfield, 3½-ton	4,200	3,900	300
Kelly - Springfield, 5-ton	4,900	4,400	500
Kelly - Springfield, 6-ton	5,100	4,600	500
Larrabee, 2½-ton	3,200	3,100	100
Master, 1½-ton	2,690	2,290	400
Master, 2½-ton (int.).	3,540	3,190	350
Master, 2½-ton (worm)	3,290	2,890	400
Master, 3½-ton (int.).	4,640	4,290	350
Master, 3½-ton (worm)	4,190	3,990	200
Master, 5-ton (int.)	5,440	5,090	350
Master, 5-ton (worm).	5,290	4,990	300
Master, tractor	3,740	3,390	350
Maxwell, 1½-ton	1,332	932	400
Menominee, 1¼-ton	2,080	2,000	80
Menominee, 1½-ton	2,725	2,475	300
Menominee, 2-ton	3,245	2,875	370
Menominee, 3½-ton	4,270	3,800	470
Menominee, 5-ton	5,450	4,850	600
Nash, 1-ton	1,895	1,595	300
Nash, 2-ton	2,550	2,150	400
Nash Quad, 2-ton	3,250	2,750	500
Nash, 2½-ton	2,550	2,250	300
Oshkosh, 2-ton	3,750	3,250	500
Oshkosh, 2½-ton	4,150	3,850	300
Packard, 2½-ton	3,500	3,100	400
Paige, 1½-ton	2,880	1,950	930
Paige, 2½-ton	3,400	3,420	980
Paige, 3½-ton	4,285	3,145	1,140
Parker, 1½-ton	2,950	1,875	1,075
Parker, 2½-ton	3,650	3,200	450
Parker, 3½-ton	4,400	3,950	450
Parker, 5-ton	5,500	4,850	650
Pittsburgher, 2-ton	3,500	3,000	500
Rainier, ¾-ton	1,990	1,970	20
Rainier, 2-ton	2,890	2,960	60*
Reo, 1¼-ton	1,245	1,185	60
Reynolds, 2-ton	3,400	2,000	1,400
Reynolds, 4-ton	3,800	2,800	1,000
Selden, 1½-ton	2,360	2,250	110
Selden, 2½-ton	3,425	3,250	175
Selden, 3½-ton	4,175	3,750	425
Selden, 5-ton	5,600	4,950	650
Seneca, ½-ton	920	820	100
Signal, 1-ton	2,475	1,950	525
Signal, 1½-ton	2,925	2,450	475
Signal, 2½-ton	3,275	2,875	400
Signal, 3½-ton	4,275	3,675	600
Signal, 5-ton	5,300	4,400	900
Stoughton, 1-ton	1,995	1,790	205
Stoughton, 1½-ton	2,350	2,150	200
Stoughton, 2-ton	2,800	2,490	310
Stoughton, 3-ton	3,600	3,150	450
Thomart, 1-ton	1,995	1,795	200
Tiffin, 1½-ton	2,400	2,100	300
Tiffin, 2½-ton	3,100	2,700	400
Tiffin, 3½-ton	4,100	3,600	500
Tiffin, 5-ton	4,800	4,300	500
Tiffin, 6-ton	5,000	4,500	500
Titan, 2½-ton	3,400	2,950	450
Titan, 3½-ton	4,550	3,950	600
Titan, 5-ton	5,400	4,550	850
Tower, 1½-ton	2,900	2,000	900
Tower, 2½-ton	3,200	2,475	725
Tower, 3½-ton	4,100	3,475	625
Transport, 1-ton	1,395	1,295	100
Transport, 1½-ton	1,995	1,495	500
Transport, 3½-ton	3,885	2,585	1,300
United, 5-ton	5,000	4,500	500
Velie, 1½-ton	2,200	1,585	615
Walker, ½-ton	2,100	2,000	100
Walker, 1-ton	2,500	2,275	225
Walker, 2-ton	3,000	2,750	250
Walker, 3½-ton	4,100	3,750	350
Walker, 5-ton	4,500	3,950	550
Walker-Johnson, Ajax.	2,000	1,750	250
Walker-Johnson, 2-ton	2,500	2,250	250
Walker-Johnson, 2½-ton	3,500	2,750	750
Walter, 5-ton	5,600	4,850	750
Ward, 750-pound	1,495	1,345	150
Ward, 1-ton	2,085	1,945	140
Ward, 1½-ton	2,475	2,355	120
Ward, 2-ton	2,975	2,835	140
Ward, 3½-ton	3,950	3,830	120
Ward-La France, 2½-ton	3,590	2,990	600
Ward-La France, 3½-ton	4,690	3,990	700
Ward-La France, 5-ton	5,590	4,590	1,000
Watson, 1-ton	1,865	1,465	400
Wichita, 1-ton	2,300	1,875	425
Wichita, 2-ton	2,800	2,400	400
Wichita, 3-ton	3,600	3,200	400
Wichita, 4-ton	4,000	3,500	500
Yellow Cab, ¾-ton	2,050	1,590	460
Yellow Cab, 1¼-ton	2,350	1,640	710

*Increase.

Highway Standardization

The committee on tests of the American Society of State Highway Officials met with the officials of the Bureau of Public Roads of the United States Department of Agriculture, in Washington, June 26 and 27, to consider standardization of specifications and tests for road materials. The purpose of this meeting of representatives from all sections of the country was not so much to lay down rigid rules as to harmonize the general practice. Standardization taking into account local conditions is being brought about by a series of meetings between officials from groups of states and engineers of the bureau.

The present activity of highway officials along this line is most encouraging for road building. A few years ago the general tendency was toward individuality in each state, without much opportunity for exchange of ideas and knowledge. To-day the tendency is in the other direction, and a better solution should be reached when the problems are discussed at meetings of the best highway engineering talent of the country.

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Can Trucks Be Greatly Improved?

By SIR JOHN E. THORNYCROFT
Managing Director John I. Thornycroft & Company

IN a review of the present position, which must necessarily constitute a starting point for any consideration of the future, it will be necessary briefly to outline the stages reached in the development of the different broad types of vehicles and in the use of various sources of power, including benzol, alcohol, and both storage and overhead electric vehicles. The present wage has been mainly reached by the natural developments of the last twenty-five years, and has been but little affected by legislation and other such special causes, but it may be questioned whether designer and manufacturer will not in the future be materially affected by these special limitations. As an instance the influence of taxation on private cars may be cited. A tax based on cylinder diameter had resulted in producing machines with engines of very high speeds and very small cylinders, and these, unfortunately, have but little sale in overseas markets where larger slower-running engines are preferred. Large trucks are now taxed by weight, and there is no reason why private cars should not be taxed on the same basis. Indeed, that is the present-day practice in a number of the colonies.

Electric motors are so standardized that only in storage batteries can one look for improvement or possibility of great change. A great advance was anticipated with the introduction of the Edison battery using an alkali instead of acid electrolyte; no doubt it will stand much rougher treatment than the older type of accumulator, but owing to its lower voltage, it offers very little difference in weight or capacity.

Small electric trucks in factories are most useful and very satisfactory, for there are always opportunities of charging them at odd times of day or when at work, and larger trucks for short runs somewhat similar conditions may perhaps have a future, but with the present form of storage battery their radius and speed is too restricted to compete with the internal-combustion engined vehicles. For congested town traffic to avoid blocks there will probably in the future have to be a low speed limit as well as a high. As constructed at present, electric vehicles at maximum speed are well below the average traffic.

Though many alternative designs of internal combustion trucks have been tried, the one generally adopted in England as the result of practical experience is that with the engine at the front over the steering axle, a disconnecting clutch and a simple change-speed gear comprising a driving and driven shaft, with gears of different ratio that can be slid in and out of engagement, thence transmission to the driving axle by a shaft and worm or bevel gears. Chain drive is still employed in some cases, but is being displayed by gear transmission. Many of the earlier designers of internal-combustion vehicles tried an engine as well as the transmission below the framing, but the relative unreliability of the engine led to the abandoning of this practice. Engines are now so reliable that ready access is perhaps less important, but it is still very desirable to be able readily to inspect them, and there is no doubt that this accounts for the present-day standard design, though in the larger vehicles there is a strong tendency to devote less of the front space to the engine, and every probability of the arrangement for the driver alongside the bonnet being further developed. Though many variations in detail have been introduced, this general arrangement can be regarded as stereotyped for a gasolene vehicle to-day.

In considering chances of any radical change, one would ask whether with increasing loads builders will adopt a drive on all four wheels. For work on made roads the ensuing complication would always be a bar to this system, but for unmade roads or across country a 4-wheeled drive offers great advantages, though probably for these conditions an ordinary truck drawn by a special tractor will be found more economical.

Assuming the continuance of one axle drive, what are the most likely modifications? Running costs are largely made up of fuel consumption and maintenance. There is no reason against a highly efficient engine and transmission producing a minimum of maintenance cost, and with the best designs this may be taken for granted; but it is a nice point for the designer to proportion the parts of his mechanism so that, with a view to reducing the wear, they are made so large as unduly to increase the weight of the machine and therefore its fuel consumption. Many trucks purchased by the government during the war were not efficient from this cause.

In spite of many schemes for improving the efficiency of the high-speed gasolene engine, there have been no great changes since these prime movers were designd for road vehicles by De Bion Bouton and others. There has, of course, been some improvement, but efficiency measured by ton-miles per gallon of fuel varies materially with different makes, and in the best of them it does not appear that we may look forward to any great improvement in the near future.

As to transmission, every conceivable arrangement has been tried, but the simplest survives. Epicyclic gear has, of course, had an enormous run in the Ford, and when only a single change is required is satisfactory, though for more than one change it has not been found so, although it would appear to possess advantages when constant changing is necessary.

Ease in effecting renewals and repairs is, of course, important, though some machines which run quite well are most expensive in this respect. The repair question is regarded differently by the comparatively small owner and those with large fleets, for in the latter case it is often customary to substitute complete new units—engine, gear, transmission, or axle. Easy removal of units, however, does not necessarily mean units that can easily be repaired in position on the chassis. The ideal is, no doubt, a combination of both these alternatives.

Leading British makers have not followed American design in combining engines and gear-boxes, though this arrangement possesses advantages in first cost and would seem in many ways theoretically right. In practice, many advantages of this arrangement can be obtained by separately mounting engine and gear-box on a common frame that can be removed as a whole, and, at the same time, allows separate opening up of each unit in position if desirable.

In the engine itself designers are continuously trying for greater economy in oil as well as fuel consumption; every alternative of valve setting has been tried as well as various sleeve-valve arrangements. The present record in this country is, however, held by a well-designed normal type of engine with inlet over the exhaust valve. On the Continent, in hope of still further economy, engineers are working with high compression, and, in some cases, trying to use small engines purely of Diesel type. If such an engine could be made with considerable range of power and revolutions, it would, of course, be a great stride for other purposes besides road vehicles, but a number of years' experience with this type does not point to its early future use on trucks.

PROBABLY we shall be able to employ aluminum to a greater extent owing to improvements which are being made in its alloys. Not long ago cast aluminum road wheels were regarded as impossible, but a number have now been successfully in service for a considerable time. No doubt the extension of its employment will depend largely on its price of production as compared with cast-iron and steel.

Coupled to some extent with the use of aluminum is the use of pneumatic instead of solid rubber tires. Solid rubber tires have made possible increased speeds and decreased structural weights, and with pneumatic tires parts at present made in steel would be satisfactory in a suitable aluminum alloy.

The relative advantages of solid and pneumatic tires are difficult to decide. For passenger vehicles and fairly heavy trucks their general use seems doubtful at present pneumatic tire costs. For the heavier loads the tire pressures are so great that road shocks on the vehicle do not seem much

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This truck will out-perform any truck of like capacity in the world in:

Speed—*High Gear Ratio, 4.7 to 1*

Hill climbing—*4" x 5" Motor*

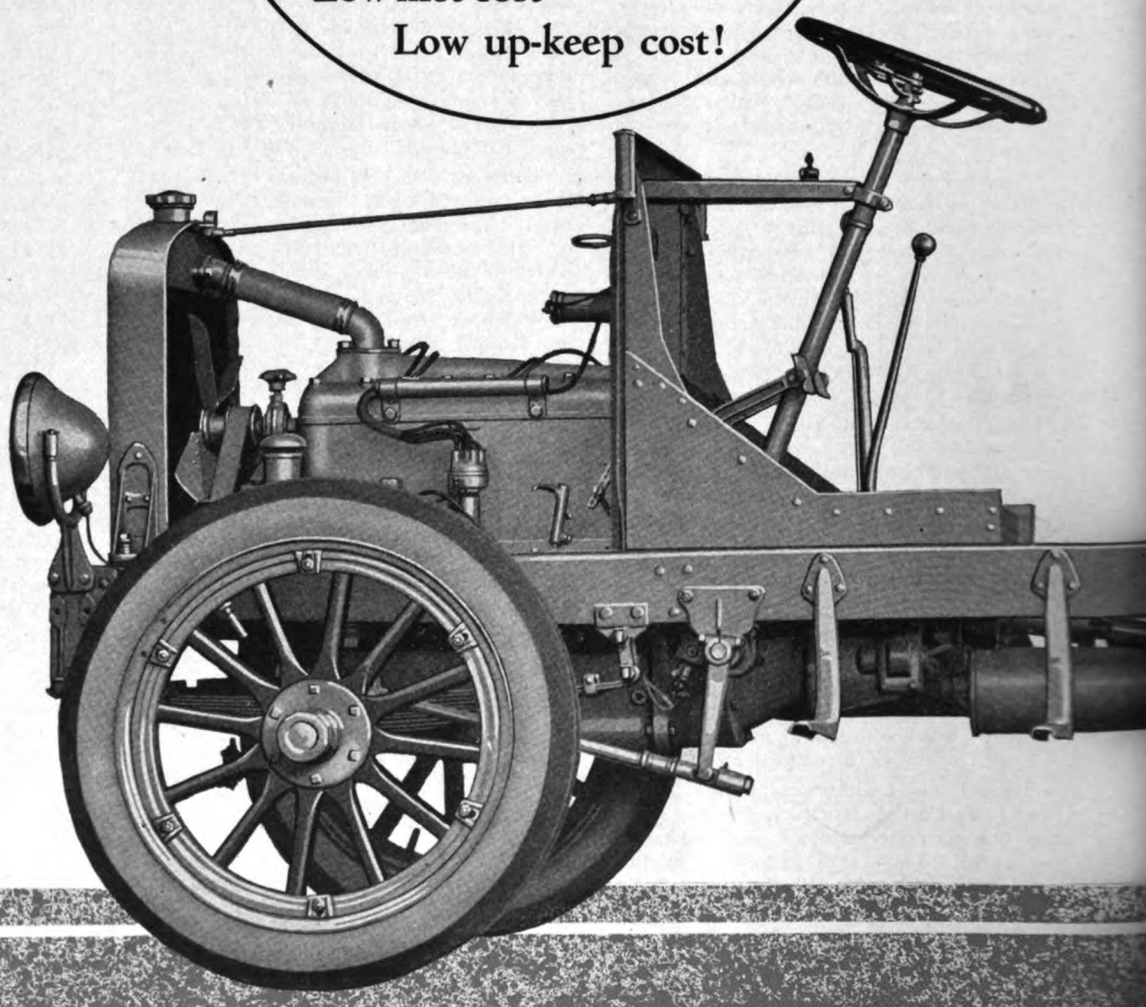
Simplicity of design

Economy of operation

Long life—*Low compression motor, 53 lbs.*

Low first cost

Low up-keep cost!



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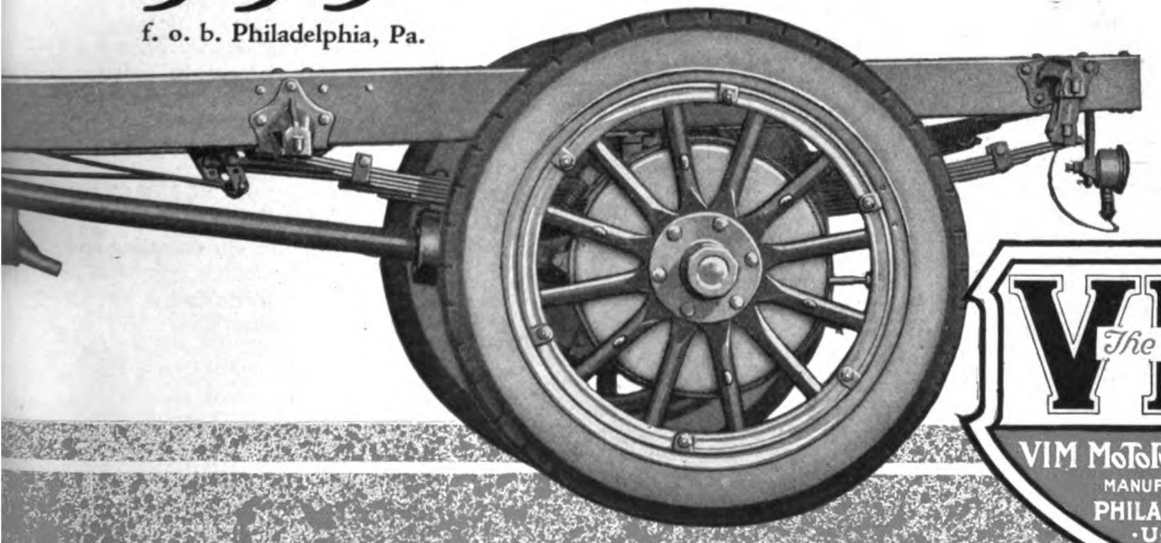

The NEW VIM

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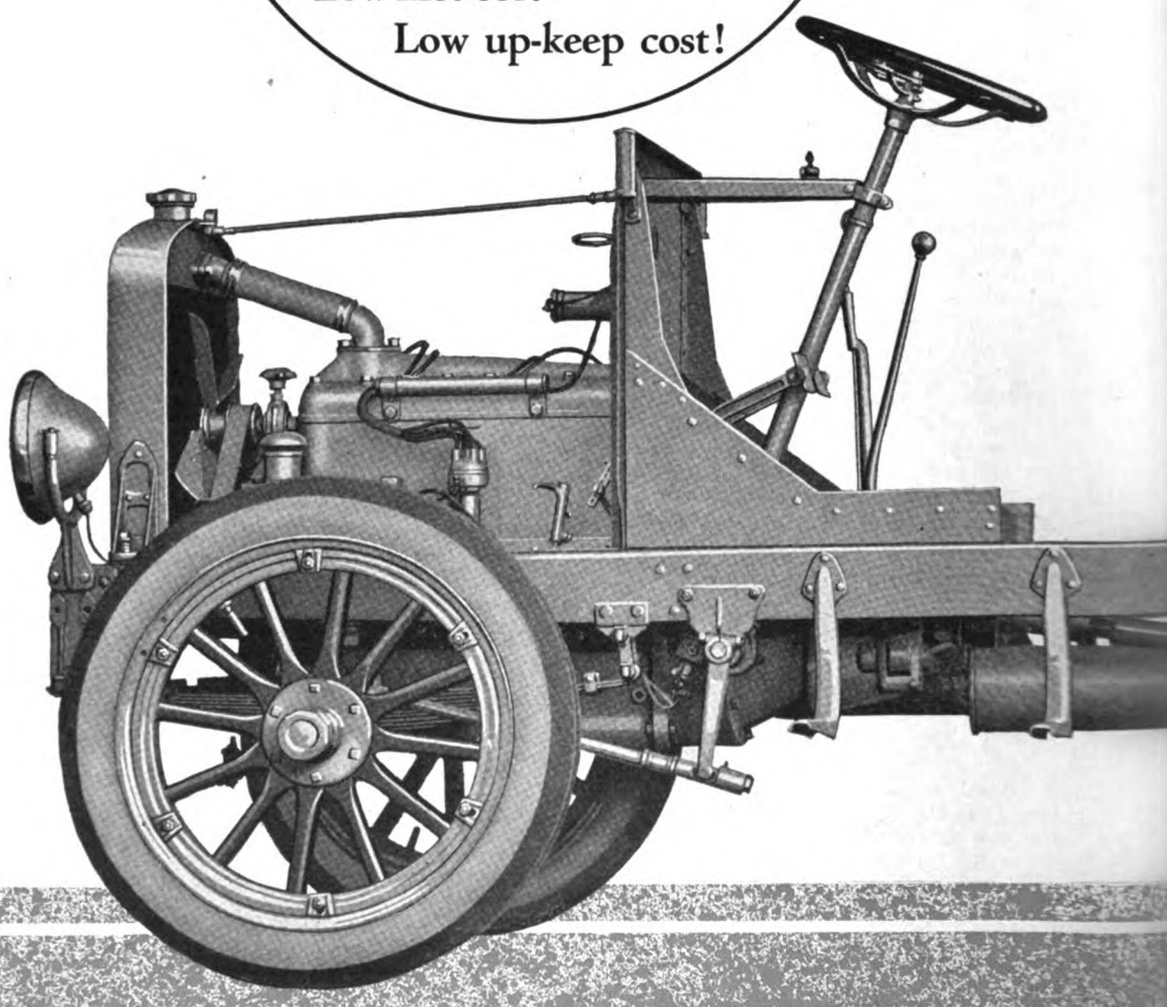

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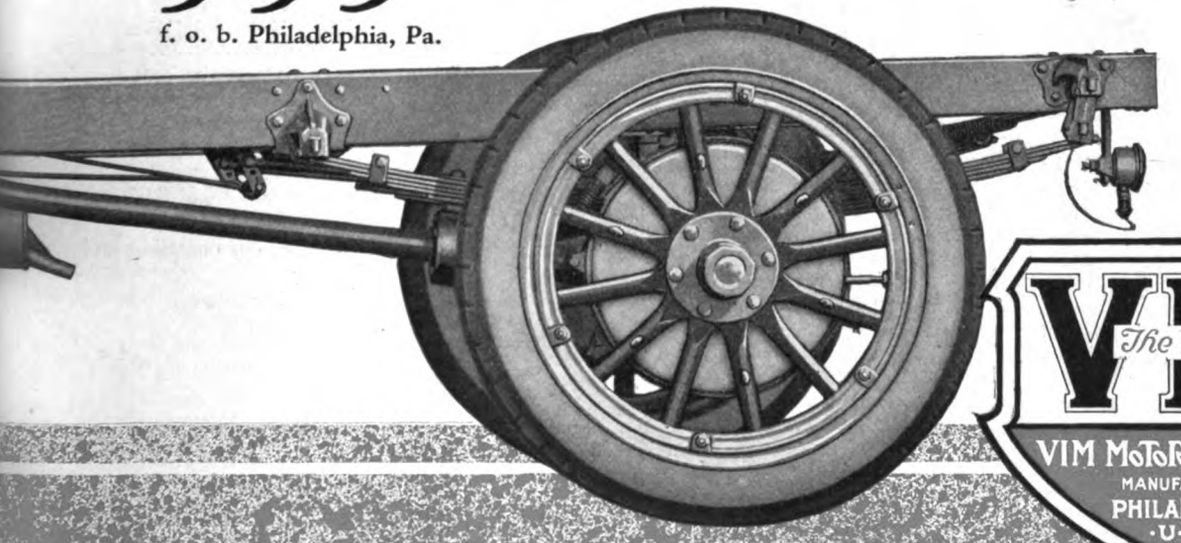

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less, and it might therefore be argued that from the aspect of road damage there is little gain. From trials hitherto it seems difficult to prove by measurement that the pneumatic tire greatly reduces the vertical movement of the vehicle by absorbing inequalities in the road surface, but beyond question riding on big pneumatics is very much easier, and while there may be no great difference in the actual motion, innumerable jars and stresses are absorbed, although vertical motion set up over a bump does not die so quickly as with the solid-tired wheel.

Unless highway authorities decide that pneumatic tires cause less road damage, and support them by legislation, any greatly extended use of the air-filled tire for heavy vehicles does not seem probable, failing a big reduction in their first cost and a lessening of some of their other disadvantages.

While chassis designers have been doing their best to save weight, with the exception of the London General Omnibus Company and a few others, little has been done to improve body construction for passengers or freight. Much of this has been left to the coachbuilder, who, no longer responsible for the complete vehicle, seems to care little for its weight. The weight of a plain truck platform is but a small proportion of the load, but in high-sided or box bodies it becomes quite a large factor.

Large carriers and railway companies now find it an economy to make up their loads on special platforms, or in containers placed, completely laden, on the chassis by cranes or wheel trolleys in the yards and depots, but the weight of these containers is often a considerable proportion of the load, and for really economical results the system yet calls for considerable improvement. Mechanical handling devices are now being demanded, power dumping mechanisms and cranes being the most usual, and on vehicles generally handled by one man such devices are most valuable. Experience with them, however, is as yet hardly sufficient to decide whether mechanical drive from the engine, or a hydraulic system pump-driven from the engine, will prove the better, but indications seem to point to the hydraulic system, except for electrics, when an independent motor is obviously the most suitable. For traffic considerations and maneuvering in depots minimum overall dimensions are, of course, very important.

From the foregoing remarks it will be gathered that I consider that, until physicists discover some new source of energy, or means of storing it, present-day road vehicle design will show no great change, and that improvement will be confined to detail design with a view to getting the maximum possible economy out of the fuel and making the machines as simple as possible to maintain.

B. F. Goodrich Company tire sales for the past sixty days have exceeded those of any similar period. Tube sales in June have never been equaled in the company's history. Solid tire sales thus far this year have run 100 per cent. above last year, and continue to increase. Production has been materially increased in anticipation of an even larger demand.

3½-Tonner Works 4½ Years at 51 Cents a Mile

By NICHOLAS CHIEPPO

New Haven, Conn.

OUR 3½-ton Selden truck has done 4½ years heavy hauling, during which it has traveled nearly 70,000 miles. It was purchased in March, 1917, and has worked steadily ever since, with the exception of the 15 days it was taken out of service for an overhaul.

The truck's principle job is hauling flour for the Pillsbury Company, the Thompson Milling Company, and other big milling companies here in New Haven. This flour is delivered to bakers, grocers and hotels all over the city. Frequent deliveries are also made to nearby cities, such as Bridgeport, Branford and Guilford. As a rule the milling companies ship the flour to us, and we store it in our warehouse until ordered to deliver it to their customers.

The truck averages 7 trips a day, and makes about 5 stops to the trip. It carries a driver and 3 helpers, for we have found that the 3 extra men more than pay for themselves in time saved in loading and unloading. The truck averages from 30 to 100 miles a day, depending entirely on the nature of the deliveries. If they are all in New Haven, the distance isn't over 30 miles. But if we have to make a couple of trips to Bridgeport, it easily travels 100 miles. The average is 50 miles a day.

Usually the flour is carried in 98-pound sacks, and averages about 80 sacks to the load. This means a load of 4 tons, which is the average. We occasionally put on considerably more, but this is the exception. If the flour is in barrels, we carry about 40 to the load.

The truck has proved very economical to operate. In its 4½ years' service, the actual cost of repair and maintenance has been only $1,200, which amounts to less than 2 cents a mile. This figure includes a thorough overhaul which the truck had about a year ago. The total lost time is the 15 days required for this overhaul. We consider that the truck is good for 2 years more, but to be conservative we are depreciating it on a 90,000-mile basis, which gives it 18 months longer life.

The truck averages 6 miles to a gallon of gasolene and 200 miles to a gallon of oil. It has cost an average of $25.62 a day, 91.50 cents per ton, and 25.62 cents per ton-mile. These figures include the wages of a driver and 3 helpers, and are certainly very satisfactory costs for our work.

If there is a let-up in flour hauling, we take on other work. On one occasion we made a trip to New York City with 500 boxes of macaroni each weighing 22 pounds and brought back 2½ tons of empty boxes. The costs were:

Variable expense (168 miles at 12.61 cents)	$21.18
Fixed expense (1 day)	2.13
Driver and 1 helper (1 day)	16.59
Total cost for the trip	$39.90

On this trip we hauled 5½ tons out of 2½ tons in, or a total of 8 tons. The hauling cost was $4.9875 per ton and 5.94 cents per ton-mile. As we received 50 cents per mile each way, our profit was $44.10. We made two trips like this.

One of our best customers is the National Folding Paper Box Company of New Haven, and for 5 months we hauled its products to New York City, a distance of 84 miles each way. The entire round trip was always made the same day and the truck usually got back by 9 o'clock at night. The loads averaged 5 tons. Sometimes we increased our profits by picking up a return load in New York. When we had no return load, the costs were:

Variable expense (168 miles at 12.62 cents)	$21.18
Fixed expense (1 day)	2.13
Driver and helper (13 hours plus meals)	15.59
Total cost for the trip	$38.90

In this case the driver and helper expense is $1 less because no time was required to put on a return load. The hauling cost with a 5-ton load was $7.78 per ton, and 9.26 cents per ton-mile. Our profit for the trip was only $3.10, as against $44.10 when we had a return load.

The longest trip we ever made was one to Philadelphia with a load of paper boxes for this concern. We brought back a load of iron beams for a New Haven contractor, who was tied up on account of the railroad strike. For these iron beams we used a semi-trailer and were able to haul 9 tons. The load of paper boxes, however, was only 5 tons. The distance to Philadelphia is 179 miles. The trip required four days. On this trip the truck carried two helpers in addition to the driver. The costs were:

Variable expense (358 miles at 12.61 cents)	$ 45.14
Fixed expense (4 days at $2.15)	8.52
Driver and 2 helpers (including expenses)	53.39
Total cost for the trip	$107.05

Hauling a total of 14 tons, the cost was $7.6464 per ton, and 4.27 cents per ton-mile. As we get 50 cents per mile on the out trip and $1 per mile on the return trip, our total income for the trip was $268.50. Deducting the operating cost of $107.05 left a profit of $161.45 for the four days.

A detailed statement of our operating and cost records follows:

OPERATING RECORDS.

Total Period.

Period covered, years	4½
Days operated	1,362
Total round trips	9,534
Deliveries, pickups	47,670
Total loads, tons	38,136
Miles traveled	68,100
Gasolene, gallons used	11,350
Cylinder oil, gallons used	340½

Daily Averages.

Round trips	7
Deliveries, pickups	35
Total loads, tons	28
Miles traveled	50
Miles per round trip	7.1
Load per trip, tons	4
Ton-miles	100
Miles per gallon gasolene	6
Miles per gallon oil	200

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COST RECORDS.

Investments.

Chassis, etc., complete	$3,700.00
Tire value	272.40
Total, less tires, to be depreciated.	$3,427.60

Fixed Charges—Yearly.

Interest on total investment (6 years) @ 7%	$ 151.08
Taxes and licenses	25.00
Insurance	350.00
Garage expenses	120.00
Total per annum	$ 646.08
Total per month (per day $2.13)..	53.84
Total for period, 4½ years	2,907.36

Variable Charges—Period.

Fuel at 25 cents a gallon	$2,837.50
Cylinder oil at $1.00 a gallon	340.50
Tires, 68,100 miles ($272.40÷15,000-mile life)	1,239.42
Depreciation, 68,100 miles $3,427.60 ÷90,000-mile life)	2,594.61
Maintenance and repairs (estimated)	1,575.00
Total variable charges (per day $6.31)	$8,587.03
Driver's wages—3 helpers (per day $17.18)	23,400.00
Total fixed charges	2,907.36
Total operating costs	$34,894.39

Unit Costs.

Cost per day operated	$ 25.62
Cost per mile traveled	.51
Cost per ton hauled	.92
Cost per ton-mile	.26
Repair cost per mile, estimated	.023
Repair cost per mile, actual	.017

Rapid Bread Delivery by a Truck Relay System

By JOHN T. COULTER

IN THE year 1882 Dan E. Hoffman, 123-29 Valancia Street, San Francisco, had visions of the possibilities of a large well-balanced, well-organized delivery system. Today, after forty years of continuous plan, study and effort, his visions have become a reality and his success has won for him the name of "Master of Transportation Details."

Starting with a 1-horse vehicle, Mr. Hoffman contracted to settle the delivery problems of a large department store in San Francisco. The delivery for this store today commands the service of 20 motor trucks. The number of horse-drawn vehicles was steadily increased from 1882 to 1916 when it totalled 200. At this period, Mr. Hoffman realized the greater possibilities of motor vehicles and began replacing "Old Dobbin" with "gasolene wagons."

Within six years, Mr. Hoffman has purchased and placed in operation over 100 motor trucks which handle the delivery of several individual institutions in San Francisco. During the month of July, 1921, Mr. Hoffman made the decision to place a fleet of 12 Garford trucks in the service to handle the delivery of Langendorf Royal Bread. This number was later increased until now the Garford equipment lists as follows: One 5-ton, one 3½-ton, nine 1¼-ton, and three ¾-ton.

At a still later date, Mr. Hoffman again decided to add other Garfords to his fleet, but for the service of the company with whom he began his contract hauling business in 1882. The contract with this concern covers the period of the next five years, at the expiration of which Mr. Hoffman will have served them continuously for forty-five years.

A very prominent feature of the organization operating this business is its low overhead cost. The organization consists of an accounting department, (Mr. Hoffman and two assistants) a service manager, four mechanics, an oil man and a night garage man. It is obvious that the methods employed in the direction of so large a fleet bespeak efficiency in organization. The comprehensive system employed for the delivery of Langendorf Royal Bread is only one instance of the efficient methods used by Mr. Hoffman.

With the fourteen machines referred to wholesale and retail bread deliveries are made within 55 mile radius of San Francisco. The outstanding feature of this delivery service is the 52-mile run to San Jose with a maximum load of 10,368 pounds of bread, 6 nights each week. This delivery is handled by the 5-ton Garford. With a full load of bread the 5-tonner leaves Langendorf Baking Company plant at 9:00 p. m. covering the distance to San Jose within 4 hours. At destination, six 1¼-ton Garfords meet it, the bread is transferred and the lighter and more speedy trucks start out for local deliveries to the consumers. Within 6 hours after the bread is taken from the ovens at San Francisco, deliveries are made to consumers in San Jose. On Friday evening each week, a 2-day supply of bread is transported, a 4-wheel trailer being attached to the 5-tonner for the additional load. This enables the consumer to provide a supply for Saturday and Sunday.

Having outside measurements of 18 feet in length, 7 feet 6 inches in width and 6 feet 8 inches in height, the body on the 5-tonner is reputed to be the second largest motor truck bread body in the United States. It has a cubical displacement of 112.6 cubic feet. The body is divided into halves by a vetrical partition running lengthwise through the middle. Each half is divided into six compartments corresponding to the six removable panels, and each compartment then is divided by shelves into four sections, each section measuring 36 inches

Two-Tonner Travels 75 Miles Daily for $18.83

By E. De MARIA

Columbus and Newark Express, Columbus, Ohio

A MOTOR truck in our service must be ready and able to go every day. Our 2 trucks average 75 miles a day, carrying heavy loads every trip.

We make daily trips to Newark, delivering all kinds of goods purchased in Columbus. We have two trucks on the road, one leaving early in the morning and the other several hours later. There have been times when it was necessary for one truck to make two trips to carry the large amount of freight consigned to Newark. In ordinary times each truck carries 3 tons per trip. We try to pick up as large a return load from Newark as possible.

All goods reaching our freight house before the trucks leave will be delivered direct to customers the same day. Our charge is somewhat higher than that of the steam or electric railroad rates, but this is made up by our quicker service. Freight shipped by our trucks is usually brought to our loading platform in Columbus. However, if a customer cannot conveniently deliver his freight to us, we will pick it up at an additional charge. On reaching Newark, the goods are delivered direct to the consignee's door, thus saving him cartage at that end.

Newark is 34 miles from Columbus by road, making a round trip of 68 miles. The remainder of the 75 miles is traveled in making deliveries. In Newark we average 25 stops a day, and there are times when we make as high as 35 a day. Most of our customers are Newark merchants, who buy wholesale in Columbus; but we frequently handle retail lots also.

Our 2-ton truck, a Garford, costs us $18.83 a day to operate. Handling 567 tons or 11,340 cwt. of merchandise during seven months, it cost us 30.39 cents per cwt. I figure it is only fair to charge $350.00 a year against the truck for maintenance and repairs, on account of the high mileage made.

Our income from one truck during the seven months has been approximately $25.00 a day, so it has netted us a profit of $1,100.00 for the period, or at the rate of $1,800.00 a year. This is below our average. When business picks up we shall materially increase this figure.

The following table shows the costs in greater detail:

OPERATION.

Days operated	183
Miles traveled	13,725
Miles per day	75
Miles per gallon of gasolene	6.8
Miles per gallon of oil	9.0

AVERAGE COST.

Cost per day (including driver)	$ 18.83
Cost per mile	.2511
Total cost for period	3,446.24

ITEMIZED COST.

Driver cost per day (including above)	$ 3.67
Depreciation per mile	.0277
Maintenance and repair, estimated per mile	.0146
Tire cost, actual, per mile	.0873

Nearly $14,000 will be saved each year by the Union Transportation Company of New Jersey through the substitution of motor rail-cars for its steam trains. The new equipment will be used on the run from Hightstown, where the company's lines connect with the Amboy Division of the Pennsylvania Railroad, to Pemberton, the southern terminus, where connection is made with the main line of the Pennsylvania.

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in length, 36 inches in width and 18 inches in heighth. The capacity of these sections in terms of 1½-pound loaves amounts to 144, making a total capacity for the body of 6,912 loaves of bread.

The capacity of two compartments contains a load for a 1¼-ton truck. Cases o f light but substantial material are used, reducing to a minimum the dead weight and at the same time, keeping the bread in a more perfect condition.

The thoroughness with which the various details of this bread hauling problem have been worked out with the ultimate intent of reducing hauling costs to the lowest possible figure is exemplary of the methods Mr. Hoffman uses in working out the problems of the various other companies for whom he operates.

N. A. D. A. Admits 140

One hundred and forty more "One of a Thousand" dealers of the country were elected to membership in the National Automobile Dealers' Association during June. These additions bring the total elected to 383 of the 500 applications that have been received since March 1, the date the campaign under the unique slogan began.

The addition of dealers in Cleveland, Jacksonville, Atlanta, Chicago, Omaha, Hutchinson, Dayton, Muskogee, Oklahoma City, Houston, San Antonio, and Richmond indicates the widely scattered nature of the work done by the organizers. The 400 members are located in 40 states and the District of Columbia, and July will see nearly every state represented as a result of the first campaign efforts to distribute the membership nationally.

To date Cleveland is the most largely represented city in the association, 18 dealers having been elected. Cleveland also has reorganized its local association on a basis of membership requirements practically the same as those exacted by the national association.

Chicago pressed Cleveland a close second as the result of the work of Henry Paulman, Pierce-Arrow distributer there. The Chicago representation so far is 10, but there are other applications pending there that may give Chicago back the lead in national association affairs that it has always held. Lynn M. Shaw, assistant general manager, has completed one month's work on the Pacific Coast and starts upon his second month in that region. P. F. Drury, assistant general manager, is closing the association's first membership campaign in New England. Boston will be added to the N. A. D. A. list of cities as the result of this campaign.

Washington Thanks 'Buses

Residents of Washington are again congratulating themselves on their ability to command motor 'bus transportation. A heavy rain paralyzed street-car service for the better part of a day recently, but the famous 'buses of the Washington Rapid Transit Company kept plying on schedule, and moved the crowds, thus repeating their feat during the famous snowstorm of last winter, when the 'buses never missed a trip, through virtually the only moving vehicles in the city.

May Tire Output Bigger

Statistics of the rubber industry for the first five months of the year, as compared with the same period of 1921, follow:

SOLID TIRES.

1921—	Inventory.	Production.	Shipments.
Jan.	303,753	21,220	29,116
Feb.	304,374	23,365	29,599
March	283,800	27,710	43,926
April	269,985	28,859	42,080
May	264,663	35,156	40,122
1922—			
Jan.	182,000	40,000	33,000
Feb.	183,000	39,000	37,000
March	182,197	49,433	48,350
April	173,748	46,664	52,309
May	170,904	57,640	60,711

CASINGS.

1921—	Inventory.	Production.	Shipments.
Jan.	5,319,605	703,430	965,417
Feb.	5,193,018	819,892	1,073,756
March	4,597,103	1,165,314	1,614,651
April	4,527,445	1,651,418	1,785,951
May	4,451,668	2,100,917	2,085,882
1922—			
Jan.	4,174,000	2,055,000	1,597,000
Feb.	4,691,000	2,084,000	1,562,000
March	5,183,286	2,645,790	2,073,963
April	5,464,336	2,401,187	2,086,651
May	5,523,095	2,721,503	2,639,273

TUBES.

1921—	Inventory.	Production.	Shipments.
Jan.	5,586,163	740,824	1,042,617
Feb.	5,415,464	916,627	1,129,881
March	5,044,861	1,346,483	1,643,690
April	4,916,772	1,762,122	1,983,571
May	4,751,880	2,210,040	2,342,567
1922—			
Jan.	5,247,000	2,343,000	1,890,000
Feb.	6,142,000	2,597,000	1,703,000
March	6,991,118	3,017,511	2,090,737
April	7,230,096	2,650,573	2,329,343
May	7,189,552	2,970,696	2,938,947

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

Parts Makers' Meeting

The fall convention of the Motor & Accessory Manufacturers' Association will be held at the Hotel Lafayette, Buffalo, on September 13, 14, 15, 1922.

In addition to the general session of the convention, at which the particular problems of the entire automotive industry will be discussed, there will be special sessions of the credit managers, the advertising managers, the traffic managers and the export managers—these four departmental meetings representing distinct functions and activities of the association for the benefit of the industry and rendering services to four hundred affiliated manufacturers of parts and equipment.

President E. H. Broadwell, vice-president and general manager of the Fisk Rubber Company, will preside at the general session.

Plans for the meeting of the credit managers are in charge of a Committee headed by C. A. Burrell, manager of the credit department of the Motor & Accessory Manufacturers' Association. Ezra W. Clark, advertising manager of the Clark Equipment Company, Buchanan, Michigan, and chairman of the Advertising Managers' Council of the association, will preside at the session attended by advertising, publicity and merchandising managers. W. O. Rutherford, first vice-president of the association and vice-president of the B. F. Goodrich Company, will be chairman of the session devoted to foreign trade. Mr. Rutherford is a member of the association's board of directors and chairman of the foreign trade committee. Herman Deuster, manager of the traffic department of the association will preside at the convention meeting on traffic and transportation problems.

Packard Has Profitable Quarter

Packard Motor Car Company sales for the third quarter of the fiscal year, comprising the period from March 1, 1922, to May 31, 1922, totaled 4,305 vehicles and amounted to 11,226,958. The net profits from operations for the quarter were $317,959. Earnings for the third quarter reduced the company's loss on account of operations during the first six months of the fiscal year so that the net loss for the nine months, including branch operations, amounts to $456,588.

During the third quarter factory inventories were reduced from $9,527,575 to $6,144,289, and factory branches' inventories from $7,250,487 to $5,117,016, or a total inventory reduction during the three months of over $5,500,000. Holdings of cash, United States government bonds and other marketable securities now amount to over $15,800,000, an improvement in these items during the three months' period of about $5,000,000.

President Alvan Macauley, commenting on the earnings, says: "During May, the last month in the third quarter, the company began for the first time to receive the benefit from the sales of its new light car and from other products manufactured from material purchased at current low price levels. The profits for the month amounted to about $430,000. The month of May, therefore, more nearly represents the earning ability than the previous months. These profits, when taken in connection with the company's present daily shipments of vehicles and the volume of business now being received, indicate that the year as a whole will be a profitable one."

'Bus Liability in Canton

An ordinance has been passed by the city council of Canton, Ohio, fixing the liability of 'bus owners. On application for a license the owner must file a surety bond with the mayor or he may file a liability insurance policy, the amount to be $5,000 for injury or death to one person where the 'bus carries 20 or more adult persons. Where the 'bus carries 20 adult persons and more than one person is injured or dies, the liability shall be $15,000. Where the 'bus carries less than 20 adults, and more than one person is injured or dies, the liability shall be $10,000.

When a surety bond is filed the bond shall be for $15,000 for 'buses seating more than 20 persons; $10,000 for less than and up to 20 persons. If an applicant for a 'bus license has more than one 'bus the bond shall be $15,000 for the first 'bus and $5,000 for each additional 'bus, provided it carries more than 20 adult persons. In case the first 'bus carries less than 20 persons the bond shall be $10,000, plus $5,000 for each additional 'bus.

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The Proper Width of Highways

By HERSCHEL C. SMITH

Assistant Professor, Highway Engineering and Highway Transport University of Michigan

THERE has been a large number of statistical data compiled throughout the country in the nature of traffic censuses and many traffic studies have been made to determine the future traffic for given highways. Most of such data are not of maximum value, however, in determining the desirable width of roadways for a given traffic, inasmuch as the variation in speeds of various classes of vehicles generally is not given consideration.

Any computation of required width of roadway based upon the assumption that all the traffic on a given highway outside a municipality will travel at a common speed should be used with great reserve, as the assumption is obviously incorrect in all but exceptional cases.

For the greater part highways outside municipalities need have but two lanes to care for the traffic which they are called upon to accommodate. Highways leading into large municipalities or connecting nearby cities, however, present a problem that calls for careful solution inasmuch as they may, and often do, carry traffic that varies in speed from about 3 miles per hour to 35 miles per hour.

In many cases the quantity of traffic approaches, and often exceeds, the economical traffic capacity of a 2-lane roadway, although computations may show that the amount of traffic anticipated from traffic surveys could be carried adequately by a 2-lane roadway if the traffic is assumed to travel at a common uniform and properly selected speed.

In cases of highways which are to carry congested traffic, the designing engineer must give careful consideration to all functions of a roadway; which should affect his decision in choosing the number of lanes of traffic to be required and the modification of widths of roadways and shoulders for any given number of lanes. The functions of a roadway which thus affect the design of its width are enumerated as follows:

(1) To provide a sufficient number of lanes to carry the traffic that comes upon it.

(2) To provide means of allowing fast moving vehicles to pass vehicles moving more slowly, the speeds being within legal and operating limits.

(3) To provide for the ranking of vehicles at the roadside in such cases as for necessary temporary repairs.

(4) To be of such a width as to discourage the taking of dangerous chances by operators of vehicles.

When a 2-lane roadway has become so congested that it is impossible to operate a vehicle without considerable loss of time due to traffic delay, its economic traffic capacity has been exceeded. This degree of congestion occurs for a traffic count of a great deal less than that equal to the computed traffic capacity of the roadway when variation in speed is not considered.

As the amount of traffic or speed variations increase, the possibility of passing a slowly moving vehicle when it is overtaken becomes less. Ultimately, it becomes entirely impossible for vehicles to pass each other and all traffic must assume the speed of the slowest moving vehicle.

To emphasize the relation that should exist between traffic and roadway widths, the result of office computations and field observations of traffic operation made by the author may be of interest. For one typical series of investigations for a 2-lane roadway, a traffic of 750 vehicles per hour was assumed, 500 of which traveled in one direction, the remainder traveling in opposite direction. Three assumptions as to variation in speeds were made.

First: 3 per cent. were assumed to travel at 3 miles per hour, 10 per cent. at 10 miles per hour, 57 per cent. at 20 miles per hour and 30 per cent. at 30 miles per hour.

Second: 13 per cent. were assumed to travel at 10 miles per hour, 57 per cent. at 20 miles per hour and 30 per cent. at 30 miles per hour.

Third: 13 per cent. were assumed to travel at 10 miles per hour and 87 per cent. at 20 miles per hour.

It was found under the first assumption that the meeting of two of the 3-mile-per-hour vehicles slowed down traffic each way along the road for a distance of one-quarter mile. The meeting of vehicles of various faster speeds affected the movement of traffic similarly but to a less degree. It was also evident that 750 vehicles per hour, two-thirds of which are traveling in one direction and under the first outlined assumption as to variation in speeds, could not be operated on a 2-lane roadway.

Under the second assumption of speeds, the meeting of two slow vehicles affected the traffic for a distance each way along the road of 300 feet, and the operation of the traffic under this assumption was entirely possible.

Under the third assumption the traffic was shown to operate smoothly and the quantity could have been considerably increased.

The results of these computations were checked by observing the operation of traffic on roadways leading into Detroit, and the observed effect of varying speeds checked the calculations quite closely.

The foregoing results should be compared with computations based upon the assumption that all vehicles will travel at a common speed. Under logical assumptions as to clearance between vehicles, and assuming that all vehicles will travel 15 miles per hour, a 2-lane roadway should carry about 2,600 vehicles per hour in each direction. If the speed is reduced to 3 miles per hour by a few heavy horse-drawn vehicles, the capacity is reduced to about 750 vehicles per hour in each direction. There can be no doubt, therefore, that the variation in speeds affects the traffic capacity and hence the required width of a roadway.

Quite obviously, a stalled machine which, through inadequacy of shoulder design of the roadway, is prevented from pulling to one side and hence blocks one lane of traffic, has the same or a worse effect on the traffic capacity of a roadway than a slowly moving vehicle. The roadway traffic capacity can be materially increased by adequate width and design of shoulders.

The safety of traffic should not be disregarded in the design of roadway widths. In the case of a 2- or 4-lane roadway, every vehicle operator realizes just when he has the right of way and when he has not. The operation of a 3-lane roadway, however, is not so simple. The center lane is not and can not be reserved for traffic in either direction, so it must be left to each individual operator to decide whether he is more entitled to this lane than another operator going in the opposite direction. Such a width of design fosters danger to traffic.

The following tentative conclusions are submitted for consideration:

(1) The design of roadway widths must give consideration to the economically desirable variation in speeds of the various classes of traffic.

(2) Any 2-lane roadway carrying intensive traffic should have a width of 20 feet and should have 5-foot shoulders capable of sustaining standing vehicles for temporary delays.

(3) A 2-lane roadway should be increased to a 4-lane roadway when the traffic is reduced to the speed of the slower vehicles through not being able to pass, if the economic loss of time will justify the expense.

(4) The building of 3-lane roadways should be discouraged due to the danger to the traveling public.

Detroit Bars "Jitneys"

Detroit, now that the municipality has acquired the lines of the Detroit United Railways, has adopted an ordinance banishing "jitneys" from the principal streets of the city and from the parks and boulevards. The ordinance takes effect October 1. "When the street-railways were privately operated there was no such consideration of trolley interests," says the American Electric Railway Association. "Now that the city owns the lines the 'jitney' is suddenly discovered to be what it is, a parasite, and the city council acts promptly. It makes a difference whose ox is gored." It is declared that "jitneys" had been taking $12,000 a day from passengers who would have ridden in the street-cars prior to the time the city took over the Detroit United Railways system.

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'Bus and Truck Line Taxes Must Be Increased

By W. V. HILL
Manager, California Electric Railway Association

IT will be my purpose to explain briefly the situation confronting the rail carriers with respect to motor 'bus and truck competition, as I understand it. This form of competition first made its appearance in our cities in 1914. For some time it was confined to the so-called 5-cent "jitneys" running up and down streets on which electric cars were operating. During the height of this epidemic there were more than 1,500 "jitneys" operating in Los Angeles.

The public, however, realizing that to allow the continuance of this unfair competition with the electric cars would soon destroy them, and realizing that the "jitneys" could not be depended on, adopted various methods in eliminating them. Some of the cities prohibited them from running through the passage of ordinances, and others voted their elimination at the polls; so to-day, insofar as the "jitneys" in California are concerned, they are practically eliminated, with the exception of some 250 operating in San Francisco in competition with both the municipal and Market Street Railways, charging 10-cent fares; and in Long Beach, where two companies are operating under franchises granted by the city. During the year 1921 these two companies handled 3,977,000 5-cent passengers, their gross earnings being $217,484.

In 1915 bills were passed by the legislature which provided a tax on 'buses and required 'bus lines to obtain a franchise similar to that required of the electric railways. Governor Johnson, however, vetoed them, giving as his reason that this particular type of utility was in its infancy and should not be handicapped, or words to this effect. During the following two years a large number of interurban 'buses and trucks commenced to operate on the highways in direct competition with both the electric and steam railroads. In 1917, after a stormy session, the legislature passed a bill placing interurban 'buses and trucks operating between fixed termini or over a regular route, and not operating exclusively within the limits of an incorporated city, under the jurisdiction of the railroad commission. The bill, however, stated that the 'buses and trucks then operating would not be required to obtain the consent of the commission to continue operation. In other words, the bill legalized their rights to operate and protected them against competition of their own class.

The law requires that any person, firm or corporation desiring to enter the business shall first obtain a certificate of convenience and necessity from the commission and provides certain rules and regulations to be observed. The commission now requires the larger companies to conform to a uniform classification of accounts, and we hope to know something more about their operations after next January, for up to the present time we have been somewhat in the dark as to just what they actually are doing and whether or not they are making money, most of them contending that they are not, knowing full well that they will sooner or later be required to pay a tax similar to that paid by other carriers to the state and also contribute toward the maintenance of the highways that they are fast destroying.

At the 1919 session of the legislature an effort was made to place on them a tax of 10 per cent of their gross receipts, but their influence was too strong, there being anywhere from fifty to one hundred and fifty representatives of the 'bus and truck interests actively working at Sacramento during the session. After several star chamber meetings of the committee the amount in the bill was reduced to 2 per cent. and passed, but vetoed by Governer Stephens. The result is that these carriers are to-day competing with the rail lines, taking their business away from them, destroying the highways, and are actually subsidized to the extent of being furnished with free rights of way and the payment of practically no taxes, with the exception of the motor vehicle tax ranging from $8.80 to $30 a car per annum—and I might add that the California Transit Company is paying only $8.80 per car, according to the information I have just received. It also pays a personal property tax on cars amounting to from $5 to $10 per annum, and it pays a nominal license imposed by cities and counties in which it operates. In this connection, however, I would state that out of our 58 counties only seven impose a nominal license of from $10 to $20 per car per annum, and only three counties require a bond to protect the public in case of accident. Of the 239 cities in the state, 125 require a nominal license similar to that of the counties, and 25 require a liability bond. It is, therefore, evident that these carriers are not taxed in excess of $50 per annum per car.

From the reports filed with the railroad commission it is difficult to ascertain just what the percentage of taxes and licenses paid amounts to per car, for the items are not segregated from the liability insurance premiums. The premium on insurance is a large item in their operations, for I am given to understand that some of the larger passenger companies had their premiums increased something over 200 per cent. last year owing to the increased hazard. One company operating in Southern California had a record of 345 accidents in nine months' operation.

According to the records of the railroad commission, there are 752 'buses, express and freight carriers operating in the state under the jurisdiction of the commission, being about equally divided between passenger carriers and express and freight carriers. There are approximately 2,000 cars in service. It is estimated that the motor trucks operate over mileage in excess of 5,000, principally over improved highways. The Motor Transit Company, the largest 'bus company in California, operating in the southern section, operates service over 719 miles of highway. The gross business of these carriers is now running close to $20,000,000 annually.

The figures from all the companies operating in the state are not available, but it may be interesting to know a little something about the operations of one or two of the more important companies. Take the California Transit Company, operating out of Oakland. According to a statement filed with the railroad commission by that company, its total operating revenue for the year 1921 was $834,295.35. This statement shows taxes assignable to operations as $4,789.52, or six-tenths of 1 per cent. of gross receipts. Now, if this company had been required by the state to pay 7 per cent. of its gross receipts, which is the percentage fixed in the King tax bill for steam railroads, it would have paid $56,667.20; or if it had paid 5¼ per cent. of its gross receipts, which is required of electric railways, it woud have paid $42,500.40. This is a fair example of the injustice placed on the rail carriers; and in addition to this tax exemption they are subsidized further with a free roadway, which is maintained in part by the moneys paid to the state by the steam and electric railroads. I might add that the California Transit Company claims a deficit of $8,853.82 for the year's operation.

Let's take another company—the Peninsula Rapid Transit Company, operating between San Francisco and San Jose in direct competition with the Southern Pacific. This company's gross revenue for 1921 was $443,426.02. The statement does not show a segregation of taxes and licenses from insurance premiums. On a 7 per cent. basis this company should pay to the state $31,039.82.

The Bakersfield and Los Angeles Fast Freight, being a truck company, had gross receipts in 1921 of $92,863.52. The statement shows that it paid 4 per cent. of its gross receipts for insurance, taxes and licenses.

These 'bus and truck carriers, realizing that there is a growing sentiment in favor of requiring them to assume their just proportion of the tax burden and to pay something for the use of the highways, are now sending out speakers throughout the state addressing Chambers of Commerce, Rotary Clubs, Lions Clubs, and other civic organizations, explaining the wonderful benefits the public is receiving as a result of their operations. Some of these statements are about as far from the truth as it is possible to deviate and get away with it. For instance, I listened to one of their speakers addressing the Lions Club. He mentioned the part played by the trucks in handling the raisin crop produced around Fresno, amounting to 240,000 tons, all handled by trucks. He wanted to know what would happen to this crop if the trucks should be put out of business, and then added that, if additional taxes were levied on the trucks, it would necessitate charging 75 cents a ton more for the handling of the raisins, which would cost these growers something like $11,000,000 additional per annum. Now

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everybody knows that the raisin crop was handled many years before the advent of trucks, and that the idea of placing a tax on them that would necessitate increasing charges 75 cents a ton is preposterous and unthinkable. He then went on to say that 90 per cent. of the milk and other dairy products was brought by motor truck into the city of Oakland, and that before the days of the truck there was from 50 to 80 per cent. wastage in marketing milk as against 2 per cent. at the present time. He finally stated that the motor truck interests were agreeable to paying 100 per cent. increase over their present taxes, but what he did not say was that 100 per cent. of nothing is nothing.

The people of California believe in a square deal, and from the favorable comments in more than one hundred papers throughout the state in the past two or three months; from resolutions passed by boards of supervisors in more than twenty counties in the state, calling on the railroad commission not to grant any more permits to these carriers until they are required to pay an adequate tax for the use of the highways; and from expressions developing from many sources, I believe that the time is not far off when our tax laws will be so amended as to remedy this discrimination.

Taxes and license fees upon 'buses and trucks should not be based upon the comparatively negligible investment, but upon the amount of business conducted, which would be in direct proportion to the extent to which the highways are used; and this sum should be sufficient to cover a just proportion of highway maintenance expense. They should also pay a percentage of their gross receipts equivalent to that paid by the rail carriers.

Speaking for the electric railways of the state, we intend to do everything in our power to see that the 'bus and truck carriers that are competing with us are brought into camp on this question of taxation. It is my honest opinion that eventually the public will require them to furnish their own right of way, as is required of the rail carriers, for with 700,000 privately owned machines utilizing our highways at the present time, and from indications that this number will increase in the future, it is safe to say that the 'bus and truck road-hog's days are numbered.

Brink's Armored Cars

Following the latest attempt to rob a bank runner of a $16,000 payroll, the Brinks Express Company in Philadelphia has come out prominently in advertisements of armored cars for payroll protective purposes. The company, which maintains armored car fleets in Chicago, New York, Boston, Cleveland and Rochester, not long ago came into the Philadelphia field but has refrained from making announcements of its presence there until its armored car fleet has been made ready. Armored cars in teams of two, manned by armed guards, transport payrolls from banks to industrial plants, or deposits to banks. The company has $14,000,000 insurance against accident.

Carrying Mineral Water at 5.36c per 5-Gallon Bottle

By J. C. BREUNICH

Port Washington, Long Island, New York

MY 2-ton truck is still in excellent condition after nearly three years of the hardest kind of service. I have used it for hauling bottled water from Forest Hills, Long Island, to downtown New York.

This work was done under contract for one of the bottling companies located at Forest Hills, and the deliveries were made to the large buildings at the lower end of Manhattan Island. The run from Forest Hills to lower Manhattan is about 20 miles, and since the truck made the two trips a day the daily mileage was 80. I used to start out at 6:00 o'clock in the morning, and didn't get back until 5:00 at night.

In September, 1920, I took a contract for the same kind of work with the Bear Lithia Spring Company, New York City. At present the truck is delivering for this concern to some of the largest buildings in lower Manhattan, notably the Equitable, Banker's Trust, Empire, and the Fire Corporation. It still makes two trips a day, but the distances are much shorter. The average daily mileage is only 40.

This drinking water comes in 5-gallon bottles weighing about 60 pounds each. Occasionally we make an extra trip hauling either bottled water or ginger ale. Although most of the trips are made to lower Manhattan, we occasionally run up to Bronx. The bottled water is always delivered to one building at a time, so there is only one delivery stop per trip.

In spite of the fact that the truck carries an overload, I have had relatively little trouble with it. It always travels over good roads; and when making the run to lower Manhattan, I pick the less congested streets. During the second year the truck was laid up for three weeks for a complete overhauling, and later another week for bearing trouble and to have the carbon removed and the valves ground. It also missed a few days during the winter when we had severe snow storms.

Up to March 17, 1921, it had run a total of over 60,000 miles and cost only $600 for repairs—less than one cent per mile. This is a remarkably low cost, and I have allowed twice this amount for estimated repairs. As I always drive the truck I am allowing myself $30.00 a week as driver.

The gasolene and oil consumption is unusually low: 8 miles to the gallon of gasolene and 157 miles to the gallon of oil. I am depreciating the truck on the basis of 85,000 miles life. This seems fair, considering that it is in good condition after having run more than 60,000 miles, and that I drive it myself. This 2-ton Garford cost $17.39 a day, 21.74 cents per mile, 8.28 cents per bottle, and 0.41 cent per bottle mile, when it was running between Forest Hills and New York City. During the last six months, making shorter hauls within the city, it has cost $12.20 a day, 30.52 cents per mile, 5.36 cents per bottle, and 0.54 cent per bottle-mile.

My average daily income from the truck under present operating conditions is $20.00. This gives me a profit of $7.80 a day, $1,193.40 for the six months already operated, and a probable $2,306.80 a year. Adding the wages allowed myself as driver gives me a total income of $3,946.80 a year.

The firm for which I am working prefers to have me do its hauling rather than operate its own trucks, because I naturally take better care of my truck than their hired drivers would. As a result my hauling costs are much lower than they could get, and I make a saving for my customer and a profit for myself. The firm knows that my bread and butter depends upon keeping my truck in condition and on the job at all times, and that it can depend on me to deliver the goods every day. The firm operates one truck, and 16 to 18 horses; but teams could not handle the work my truck is doing, on account of the distance of the hauls.

Service Is Key to Sales

According to Frank E. Smith, president and general manager of the Republic Sales Corporation, "Service is proving to be the keynote of the entire sales situation in the motor truck industry. Operators are to-day more insistent than ever that the trucks they buy be supported by adequate local service facilities to guarantee against unprofitable interruptions in operation. Of course, local service facilities can only be as efficient as the source from which they secure their repair parts, and this factor has been made the subject of special study by the Republic organization in order that the 75,000 or more Republic trucks in use will be given the type of service that completely satisfies owners.

"To show how important we consider the element of time in service trucks, our service department at Alma reports that during April a total of 3,157 parts orders were entered. Of this number, 3,143, or 99.6 per cent., were shipped the same day they were received. In May 3,153 orders were booked, of which 3,138, or 9.5 per cent., were shipped on the day of receipt. June showed a total of 3,680 orders, of which 3,658, or 99 per cent., were put in transit before the close of the day on which they arrived.

"The result of stressing promptness in parts shipments from the Alma factory is clearly shown in our current sales reports. Our branch house as well as our distributers state that local truck users are becoming more and more impressed with our system of instantaneous service. The satisfaction which they experience is being passed on to prospective truck buyers. As a result, recommendations from satisfied owners have accounted for material increases in our sales during the past three months."

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New Federal 1-Tonner

The Federal Motor Truck Company is the latest to announce a new "delivery type" truck. It has been named the Federal Fast Express, Model R2, and is, according to its builders, capable of carrying any reasonable load up to the limit of its 5-inch cord tire capacity at a speed of 35 miles per hour.

The Federal Fast Express has a chassis weight of 2,950 pounds, body allowance 900 pounds and, with a 1-ton load, a total road weight of 5,850 pounds. Its wheel-base is 132 inches, track 56 inches, loading space back of seat 110 inches.

The power-plant is the Continental J 4 motor, the same as has been used for the past two years in the Federal Model SD. It has forced-feed lubrication and centrifugal water pump, with a bore of 3¾ inches and 5-inch stroke. Its 3-bearing crankshaft is 2¼ inches in diameter and its camshaft, also three bearings, 1¼ inches. The engine is equipped with an adjustable heated exhaust manifold for summer and winter driving.

The final drive is Timken worm and worm wheel, the same as is used in all Federal models. In addition to the above two well-known units, the Fast Express has such parts as Eisemann magneto, Zenith carbureter, Oakes fan, long radiator core in a heavy pressed-steel shell, Borg & Beck clutch, Detroit transmission, Peters universal joints, Gemmer steering-gear, Stewart-Warner vacuum tank, Disteel wheels, U. S. Royal Cord tires, Alemite chassis lubrication, Remy starter and generator and Exide heavy truck service battery. Other features are chrome vanadium springs, adjustable electric lights mounted out of the way on the dash, electric horn, and pressed-steel dash and toe boards.

The dry disk clutch has large 10-inch facings; the brakes are 15 inches in diameter with 2½-inch facing; the magneto has variable spark control; the two propeller shafts are 1¾ inches in diameter; the pressed-steel frame is 5 inches deep by 3½ inches wide by 3/16 inch thick; the chrome vanadium springs have 7 leaves front and 9 rear; the gear ratios are high 5.6 to 1, second 9.4 to 1, low 17.4 to 1 and the reverse 21.0 to 1.

The use of a vacuum-feed gasolene system allows placing of the gasolene tank out of the way under the seat, yet gives positive fuel fed on all grades. The tool box and battery are also placed under the seat for convenience.

In preparation for the demand for body equipment for the light job, the Federal company has made arrangements to furnish any style body mounted and painted ready for work. Thirty-two different combinations of seats, bodies, windshields and cabs have been worked out to fill practically every need of express or delivery work. Many of the combinations are interchangeable on the same body and with the same top.

New Heil Hand Hoist

The Heil hand hoist is designed to handle loads up to three or four tons. It can be mounted on any make or model of light-duty truck. It supplies the demand of users of motor trucks for a simple, powerful and dependable hand hoist reasonably priced.

The mechanism of the hoist is very simple. The cable is one continuous piece secured to a drum. When the body is being raised the cable is wound on this drum in a continuous scroll which eliminates any pinching and wearing of the cable. The drum itself is mounted on a large diameter spur gear driven by a pinion and a pair of bevel gears. The working parts are incased to keep out dirt.

These gears are so arranged that approximately 2½ tons lifting effort is secured with 30 pounds pressure applied to the crank, which is held from turning back by a ratchet pawl. This pawl can be used to hold the body at any desired elevation. The handle is removable.

Lowering the body is effected by raising the ratchet pawl. The descent of the body can be controlled by a Thermoid-faced brake disk operated by a handle within easy reach of the operator.

The hoist is mounted on adjustable base brackets which can be spaced to fit the frame width of any truck. These brackets occupy 7½ inches of space. A heavy coil spring is placed at one end of the bracket; the other end is pivoted so that as the body is raised the springs will be compressed, allowing the hoist to incline toward the body, thus giving a greater dumping angle as well as making it easier for the operator. These springs, together with a one-way pivot, hold the hoist so that it can not slap against the cab or body or vibrate when the truck is moving.

The hoist is fitted with an equalizing cross-arms which allows the body arms to be attached to the body outside the chassis frame. This simplifies the mounting of the body and saves loading space. The sheaves at the ends of the cross-head are on swivels so that the cables will not bind. All bearings are oversize. The two main shafts are fitted with Alemites. The body arms, to which the cables are attached, are furnished with the hoist. They can be either riveted or bolted under the body.

Bodies are regularly equipped with a tail-gate operating device and double-acting tail-gate and are painted battleship grey. Hand hoists are painted red.

AUTOMOBILE INDUSTRIAL EXPANSION, 1914 TO 1922.

Company.	Working Capital		Increase 1914-1921		Cash and Investment Securities	Inc. or Dec. in Capital Liabilities Less Stock
	Dec. 31, 1921.	Dec. 31, 1914.	Amount.	Per centage.	Dec. 31, 1921.	Dividends.
General Motors	$ 94,567,963	$ 23,419,213	$71,148,750	304	$40,089,639	$263,861,337
International Harvester	152,046,743	128,308,278	23,738,465	34	9,185,136	2,587,102
International Motor	17,254,018	530,847[1]	17,784,865	...	3,222,202	8,283,041
Packard Motor Car	29,860,197	9,173,594	20,686,603	225	10,501,839	16,871,470
Pierce-Aarrow Motor Car	4,985,801	11,952,905[2]	6,067,104[1]	55[1]	869,588	1,250,000[1]
White	14,431,931	10,067,653[2]	4,364,278	43	1,512,317	9,000,000
Electric Storage Battery	15,600,374[3]	3,224,778	12,375,596	383	8,222,294[3]	979,325
B. F. Goodrich	48,231,289	19,037,997	29,193,312	153	2,616,963	38,236,000
Kelly-Springfield Tire	9 912,120	2,463,829	7,448,291	302	2,357,977	16,789,551
United States Rubber	83,723,718	43,160,496	40,563,222	94	12,998,905	110,365,800

Company.	Inventories as of December 31				
	1921.	1920.	1919.	1918.	1914.
General Motors	$108,762,625	$164,684,679	$128,696,652	$ 91,132,515	$ 11,642,370
International Harvester	114,085,766	131,134,797	39,565,233	114,516,302	35,402,598
International Motor	9,675,583	15,588,948	9,119,658	7,388,546	1,221,534
Packard Motor Car	18,730,445	29,359,327	18,051,749	22,399,169	6,394,865
Pierce-Arrow Motor Car	11,246,697	16,470,662	13,545,422	14,582,749	9,680,057[2]
White	13,351,452	22,989,073	15,728,141	10,156,558	6,835,176[2]
Electric Storage Battery	6,960,133[3]	10,313,479[3]	4,894,660	5,528,591	1,726,381
B. F. Goodrich	29,618,936	72,631,058	54,184,975	34,965,692	11,308,857
Kelly-Springeld Tire	5,525,739	9,751,388	7,073,643	5,945,417	1,795,365
United States Rubber	76,942,027	123,503,030	87,633,699	70,704,226	33,606,741

Company.	Earnings Retained for Surplus Each Year After All Cash Dividends						
	1921.	1920.	1919.	1918.	1917.	1916.	1915.
General Motors	$65,459,057[4]	$14,236,660	$38,468,431	$ 1,667,753	$20,429,596	$17,010,438	$13,408,839
International Harvester	5,178,540[4]	6,705,353	3,608,726	6,985,325	5,658,871	9,619,257	6,096,576
International Motor	1,009,686[4]	1,128,781	716,357	812,997	647,522	28,690	475,955
Packard Motor Car	4,833,777[4]	3,884,027	3,334,389	4,346,320	3,930,055	5,355,818	1,915,927
Pierce-Arrow Motor Car	8,963,712[4]	969,915	1,378,570	403,241	2,173,748	4,070,259	.....
White	5,810,648[4]	410,014	1,613,117	1,400,585	2,520,308	2,541,041	.....
Electric Storage Battery	2,104,891	2,594,557	961,702	1,482,395	1,377,915	932,089	710,784
B. F. Goodrich	*12,511,972[4]	*5,371,791[4]	9,600,186	11,452,114	6,296,677	5,257,764	10,317,558
Kelly-Springfield Tire	1,479,928[4]	247,498	1,305,883	716,624	1,453,585	957,571	979,080
United States Rubber	*17,276,941[4]	9,522,265	10,570,618	11,090,540	10,358,514	5,443,113	2,882,047

*Before estimated taxes for the year. [1]Decrease. [2]Fiscal year 1916. [3]Figures consolidated with those of the Willard Storage Battery Company, all of whose stock is owned. [4]Deficit.

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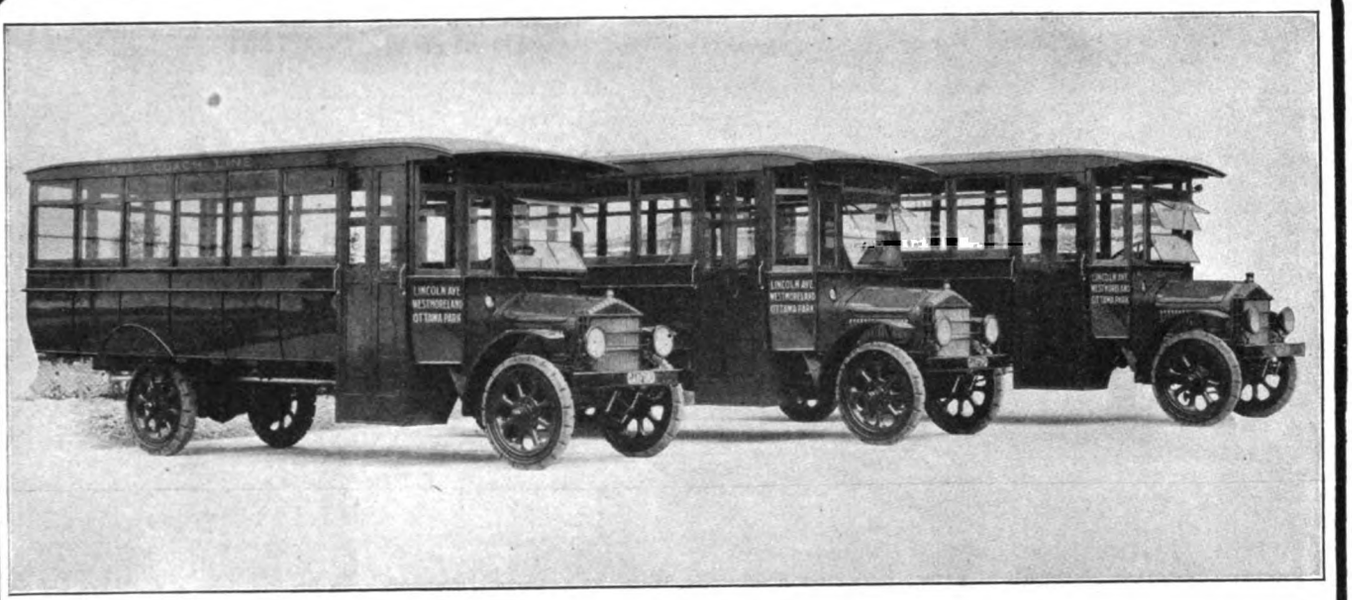

GARFORD

are selling a great many of their Two Ton Trucks equipped with the New Type of Smith Cushion Wheel. Many different bus lines now have their Garford busses equipped with them. All trucks need the New Type of Smith Cushion Wheel just as much as the automobile needs the pneumatic.

Garford has used for years the rigid type of Smith Wheel as standard equipment on their 3½, 5 and 7½ ton trucks.

The Garford Motor Truck Company recognize the Quality and Value of Smith Cushion Wheels.

SMITH WHEEL INC.
SYRACUSE, N.Y. U.S.A.

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Packard Standardizes Repairs

After nearly two years of study by factory executives and distributers, the Packard Motor Car Company has adopted a system of standardized service. The factory has been enabled to standardize the specifications for performing approximately 400 of the most common repair jobs.

Operation of this plan, which will go into effect soon, permits Packard service being performed throughout the country on a definite price basis. Such work, of course, will be based on use of the standard Packard specifications which have been developed by the largest distributing points and checked through time studies at the plant.

While the new plan was under consideration, Packard distributers from the large centers gathered in Detroit and compared service costs. The result has been a closer supervision and a reduction in costs to the car owner in many operations to a point below that previously deemed possible.

Increase in Motor Traffic

In building a road liberal allowance should be made for future increase in traffic, says the Bureau of Public Roads of the United States Department of Agriculture. A traffic count conducted by the bureau in co-operation with Tennessee officials on a number of roads in Davidson County, in which Nashville is located, shows surprising facts when compared with a similar count in 1916. During this period automobile registrations have doubled, while the number of motor vehicles on the road is five times as great as in 1916. In 1916 horse-drawn and motor-vehicle traffic were almost equal in volume. In 1921 horse-drawn traffic had decreased only slightly in volume and constituted 16 per cent. of the traffic, motor vehicles constituting 84 per cent.

Observations in this and other counties lead to the conclusion that volume of traffic may increase in much greater proportion than the number of motor vehicles and will also depend to a large degree on the condition of improvement of the road and on the economic conditions in the adjacent territory.

Britain's Foreign Trade

During the month of May British exports of motor trucks reached a value of $136,525 as compared with $343,225 in May of 1921 and with $319,665 a year previous. Car exports in May of this year were valued at $398,290, in 1921 they were $459,225 and in 1920 $900,650. Exports of chassis amounted to $165,940 this May $435,610 in May of 1921, and $810,690 in May of 1920. The total value of all automotive exports—trucks, cars, chassis, parts and tires—fell from $5,288,110 in May of 1920 to $2,560,945 in May of 1921 and to $1,925,115 in May of this year.

Imports of trucks in last May amounted to $47,135, whereas they were $165,780 in May of 1921 and $1,770,495 in May of 1920. All imports of automotive products fell from $11,182,075 in May of 1920 to $4,391,920 in May of 1921 and then rose to $5,472,215 in May of this year. The gain in imports is due to increased purchases of chassis, cars and tires.

EXPORTS OF MOTOR TRUCKS AND PARTS, APRIL, 1922.

Countries.	Gasolene Trucks and 'Buses. 1 Ton and Less. (No.)	(Value.)	Over 1 to 2½ Tons. (No.)	(Value.)	Over 2½ Tons. (No.)	(Value.)	Parts. (Value.)	Electric Trucks and Cars. (No.)	(Value.)
Europe—									
Azores and Madeira Isl..	...	....	...	.....	...	.....	$ 160	...	.....
Belgium	157	$41,323	1	$3,000	...	.....	30,149	...	.....
Bulgaria	...	.....	...	.....	...	.....	109	...	.....
Czechoslovakia	...	.....	...	.....	...	.....	4	...	.....
Denmark	...	.....	...	.....	...	.....	216,883	...	.....
Finland	1	800	...	.....	...	.....	1,311	...	.....
France	...	.....	2	3,240	...	.....	129,365	1	$4,072
Germany	2	849	1	1,800	...	.....	1,731	...	.....
Greece	1	404	...	.....	...	.....	3,137	...	.....
Iceland and Faroe Islands	...	.....	...	.....	...	.....	187	...	.....
Italy	...	.....	...	.....	...	.....	4,320	...	.....
Latvia	...	.....	1	425	5	$17,000	379	...	.....
Malta, Gozo and Cyprus Islands	...	.....	...	.....	...	.....	1,041	...	.....
Netherlands	...	.....	...	.....	...	.....	7,529	...	.....
Norway	71	21,506	11	8,897	...	.....	14,532	...	.....
Poland and Danzig.....	...	.....	...	.....	...	.....	28	...	.....
Portugal	...	.....	...	.....	...	.....	2,518	...	.....
Roumania	...	.....	...	.....	...	.....	513	...	.....
Russia in Europe.....	...	.....	...	.....	...	.....	429	...	.....
Spain	40	10,528	1	2,079	2	4,133	200,154	1	4,775
Sweden	40	14,620	...	.....	...	.....	13,763	...	.....
Switzerland	...	.....	...	.....	...	.....	1,033	...	.....
Turkey in Europe.....	6	2,128	...	.....	...	.....	3,981	...	.....
Ukraine	...	.....	...	.....	...	.....	625	...	.....
England	1	1,032	1	1,080	...	.....	473,764	...	.....
Scotland	...	.....	...	.....	...	.....	811	...	.....
Ireland	...	.....	...	.....	...	.....	7,374	...	.....
Yugoslavia, Albania, etc.	...	.....	...	.....	...	.....	1,153	...	.....
N. and S. America—									
British Honduras.....	...	.....	...	.....	...	.....	390	...	.....
Canada	47	36,731	97	113,350	52	116,846	1,946,003	1	400
Costa Rica.....	..	.....	...	.....	...	.....	940	...	.....
Guatemala	...	.....	...	.....	...	.....	1,856	...	.....
Honduras	2	545	1	3,935	...	.....	1,893	...	.....
Nicaragua	...	.....	...	.....	...	.....	250	...	.....
Panama	...	.....	...	.....	...	.....	4,885	...	.....
Salvador	...	.....	...	.....	...	.....	2,084	1	3,500
Mexico	36	11,507	22	20,377	1	4,751	60,041	1	875
Newfoundland and Lab..	...	.....	...	.....	...	.....	3,632	...	.....
Barbados	...	.....	1	2,500	...	.....	3,179	...	.....
Jamaica	15	6,197	1	1,610	...	.....	9,346	...	.....
Trinidad and Tobago.....	10	4,040	...	.....	...	.....	3,445	...	.....
Other British W. Indies.	12	4,899	...	.....	...	.....	2,037	...	.....
Cuba	12	4,081	2	3,634	1	2,835	83,612	...	.....
Dominican Republic.....	...	.....	...	.....	...	.....	3,291	...	.....
Dutch West Indies.....	1	414	...	.....	...	.....	1,152	...	.....
French West Indies.....	...	.....	...	.....	...	.....	925	...	.....
Haiti	...	.....	...	.....	...	.....	2,827	...	.....
Virgin Islands of U. S...	...	.....	...	.....	...	.....	1,073	...	.....
Argentina	...	.....	1	2,108	...	.....	293,423	...	.....
Bolivia	...	.....	...	.....	...	.....	631	...	.....
Brazil	...	.....	...	.....	...	.....	43,502	1	1,620
Chile	9	3,762	...	.....	...	.....	8,190	...	.....
Colombia	...	.....	...	.....	...	.....	3,702	...	.....
Ecuador	...	.....	...	.....	...	.....	764	...	.....
British Guiana.....	...	.....	...	.....	...	.....	905	...	.....
Dutch Guiana.....	...	.....	...	.....	...	.....	2,668	...	.....
French Guiana.....	...	.....	...	.....	...	.....	45	...	.....
Peru	15	6,060	...	.....	...	.....	8,777	...	.....
Uruguay	10	2,632	...	.....	...	.....	19,996	...	.....
Venezuela	5	2,041	...	.....	...	.....	8,927	...	.....
Asia—									
Aden	...	.....	...	.....	...	.....	350	...	.....
Armenia and Kurdistan.	4	2,803	...	.....	...	.....	.....	...	.....
Ceylon	...	.....	...	.....	...	.....	638	...	.....
China	3	2,274	7	3,430	...	.....	9,388	...	.....
British India.....	6	6,277	3	4,860	...	.....	20,527	...	.....
Straits Settlements.....	...	.....	...	.....	...	.....	7,581	...	.....
Other British East Indies	...	.....	...	.....	...	.....	53	...	.....
Other Dutch East Indies	...	.....	3	3,089	...	.....	1,339	...	.....
Java and Madura.....	...	.....	...	.....	...	.....	11,343	...	.....
French Indo-China.....	...	.....	...	.....	...	.....	2,290	...	.....
Hejaz, Arabia and Mesopotamie	...	.....	...	.....	...	.....	3,670	...	.....
Far Eastern Republic....	...	.....	...	.....	...	.....	250	...	.....
Hongkong	...	.....	1	1,910	3	5,500	1,414	...	.....
Japan	50	25,980	2	3,817	4	8,687	41,376	12	15,740
Palestine and Syria.....	...	.....	...	.....	...	.....	8,038	...	.....
Persia	...	.....	...	.....	...	.....	430	...	.....
Philippine Islands.....	...	.....	...	.....	...	.....	24,357	...	.....
Siam	...	.....	...	.....	...	.....	401	...	.....
Oceania—									
Australia	10	13,526	63	81,159	5	6,633	104,394	1	3,000
New Zealand.....	2	2,616	2	3,996	...	.....	14,960	...	.....
Other British Oceania...	...	.....	...	.....	...	.....	264	...	.....
French Oceania.....	...	.....	...	.....	...	.....	292	...	.....
Other Oceania.....	...	.....	...	.....	...	.....	208	...	.....
Africa—									
British West Africa.....	...	.....	...	.....	...	.....	11,450	...	.....
British South Africa.....	...	.....	...	.....	...	.....	10,564	1	1,809
British East Africa.....	...	.....	...	.....	...	.....	494	...	.....
Canary Islands.....	...	.....	2	3,611	...	.....	856	...	.....
French Africa.....	...	.....	...	.....	...	.....	2,371	...	.....
Egypt	3	1,244	...	.....	...	.....	12,304	...	.....
Morocco	...	.....	...	.....	...	.....	126	...	.....
Portuguese Africa.....	9	3,636	...	.....	...	.....	.....	...	.....
Portuguese East Africa..	...	.....	...	.....	...	.....	386	...	.....
	580	$274,455	226	$273,907	73	$166,385	$3,933,488	20	$35,791

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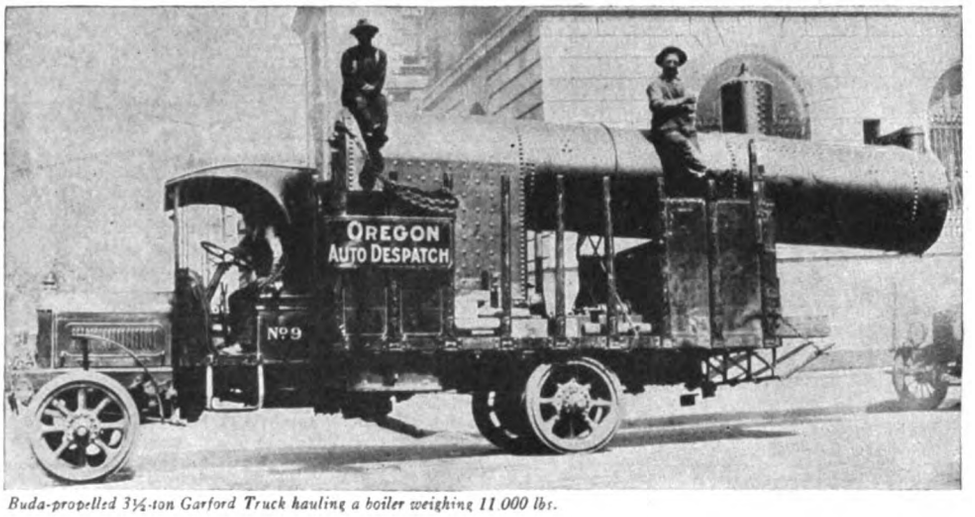
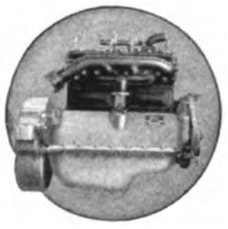


Buda-propelled 3½-ton Garford Truck hauling a boiler weighing 11 000 lbs.

It walks away with massive loads



BUILT FOR A PURPOSE

Every good truck operator knows that as a regular thing it is bad business to overload his truck, and certainly no experienced manufacturer would advocate that practice. But there are occasions when rated capacity must be overshadowed by the job at hand. In such emergencies, the truck equipped with a Buda engine can rely on the reserve power and stamina of that rugged engine. The same qualities that in everyday hauling produce dependable performance at lower cost will stand up to the sudden demand. There is a Buda engine for every hauling purpose, and standard Buda service is available all over the country.

THE BUDA COMPANY, HARVEY CHICAGO SUBURB ILL.
ESTABLISHED 1881

BUDA
The
ENGINE

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Correspondence

General Correspondence, Criticisms, Suggestions, and Discussions Concerning Any Subject of Interest to Those Who Design, Manufacture, Sell or Use Commercial Motor Vehicles, Their Parts or Accessory Equipment, Are Solicited

Too Many Manufacturers

To the Editor.—In connection with the arguments advanced in your recent editorials I may say that I have, almost single-handed and not without a great deal of opposition, been pounding away at the various standardized parts purveyors, endeavoring to convince them that there are too many truck manufacturers in the trade, and that, by selling every new man and thereby dividing their output among many instead of among the stable manufacturers who obviously must form the backlog of their business, they are lending themselves to increasing competition, which in turn is bound to reflect unfavorably in the profit showing of the established firms in the business. I tried to point out that this is the only true regard for the manufacturer, and that an increase in the number of truck makers means a larger number of selling agencies over the country, and that new dealers, in the main are established among curbstoners and others who carry their offices in their hats and who sell at all sorts of cut prices and on the basis of ridiculous trade-ins to the very great detriment of the established dealers in their respective towns and cities. Such itinerant dealers also, as we well know, often sold the trucks they were representing to men who had no experience in the contracting or hauling business, frequently parting with their trucks on the basis of a very small or no down payment and very long time for the balance, in addition to a cut price, while these buyers, in turn, ruined the hauling business in their local territories because, being compelled to make payments on their trucks and not knowing what actual hauling costs were, they simply took a "pot shot" and made a price whether it would really work out or not, thereby completing the vicious circle from the parts purveyor to the ultimate user, every step of which was attended with loss for those who had to compete against the unbusiness-like methods that were indulged in at every turn.

It was only after three years of constant hammering, covering almost reams of correspondence, that I was successful last November in inducing one of the large parts purveyors to agree that its policy of selling the small itinerant truck maker was wrong and in exacting a promise that it would not furnish that class of trade in the future but would reserve its output for legitimate makers, and, as far as I know, that promise has been kept. There is, however, much constructive and coöperative work necessary to be done along that line if the truck trade (which has for nearly two years been so badly in the doldrums) is to be lifted up to where it can get a breath of fresh air and again go ahead on a business-like basis. We are willing to continue fighting along that line, but we hope that a greater interest will be manifested by all concerned and that some strong, combined movement can be made in the direction which I have referred to and which has been pointed out in your editorials.

GENERAL SALES MANAGER.

Lima, Ohio.

The Pirate Dealer

To the Editor.—You are to be congratulated on the courageous stand you are taking for the conservation of the worth-while dealer. We experience here the very situation you describe and have exhausted our capacity for straight thinking in an effort to devise some method of crowding out the pirate dealer. The unit manufacturing group is very much interested in the so-called pirate parts maker, but I wonder if they have ever stopped to consider how much of that evil—like the evils of pirate truck manufacture and pirate truck selling is due to their own policies. The parts makers who have sold their products indiscriminately to fly-by-night truck makers would have much to answer for if the blame for our present situation was laid on the proper shoulders.

DISTRIBUTER.

Cleveland, Ohio.

Branch-House Losses

To the Editor.—For nearly four years I have operated a branch for the (motor truck company) in this city, starting with nothing but authority from the factory to open the branch, and in that time I have not received a word of suggestion, criticism or help from the home office and no factory representative, except a public accountant (who did nothing but check the totals of our books each year), has ever visited our plant. We had to determine on the size of our service department and parts stock, on trade-in policies, time-payment arrangements, branch-house layout, even the bookkeeping system without five words of comment or proffered help from the factory. That we have been able to show a profit is, it appears to me, a miracle: that we might have shown a much greater profit with factory help is, to me, a certainty.

The factory is a concern that produces cars and trucks in large quantities and has made a successful record, yet no two of its two dozen branches is run on the same plan, no two have even the same accounting system, no two have the same authority in the matter of expenditures and contract-making power. I have worked in many of them and know the managers of all intimately. The wastefulness of such a system—or rather the lack of it—must be enormous; in our first year we lost more than $60,000 that might have been saved had we had the benefit of factory guidance. We have been operating on a 35 per cent. basis, roughly, and could, I am confident, have reduced this figure to less than 25 per cent. had we been empowered to correct the evils that were everywhere around us. I have talked with branch managers of other large concerns, both here and in other cities, and I have found several instances of similar irregularities. The average factory seems to give the branch manager too much responsibility and too little authority, too much work and too little help. This may be a good part of the cause for the many complaints of the high cost of branch-house operation heard from truck makers. In our case and one or two others I know positively that lack of factory interest and coöperation was responsible for the losses shown by branch-houses.

BRANCH-MANAGER.

St. Louis, Mo.

Limitations of Truck Radio

For the benefit of fleet owners who are considering the use of radio outfits on their trucks, H. J. Tyzer, of the American Radio Association, has explained what they would have to contend with when he spoke recently to the members of the Electric Vehicle Bureau in Boston. He told of two power companies in the South that were using radio service now, but under a handicap, and explained why.

"The United States Government controls the air," he said. "It is possible to put in a transmitter in a garage and to equip trucks with receivers by using the loop antennæ. But to get real service as through a telephone, the driver must be able to talk back. At present he could not call the garage or store because he has not been allotted a wave length. In other words, the wave lengths are controlled and allotted by the government to prevent a jam in the air.

"Now, what is needed is for the motor vehicle interests to get together and ask for a certain wave length. Because of the short distance between the ordinary service station and the truck, say about 10 or 15 miles, a short wave length would do. Once this is arranged, all fleet owners could get licenses to equip their vehicles for radio.

"The electric truck is better adapted for the radio than the gasolene vehicle, because it has a higher voltage of batteries, running up to 80. But it would be possible to use the battery on a gasolene vehicle for the short wave length. It is feasible, and in time we shall think nothing of the truck driver calling up his headquarters and getting information about what is wrong, where to go and how to do it."

Farmers 150 miles distant from Detroit have brought in their strawberries by trucks. Strawbery shipments into the Pittsburgh, Oregon, market have also been made by truck. Growers and commission men generally report that the berries arrive in better condition and bring better prices when shipped by truck.

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New Harvester Truck Plant

Ground has been broken and work commenced on a new factory of the International Harvester Company at Fort Wayne, Indiana, for the manufacture of motor trucks. The new plant site consists of 143 acres on the Chicago-New York line of the Pennsylvania Railroad. Three buildings, of steel, concrete and brick with wood-block floors and gypsum roofs and a power-house with a total area of 200,000 square feet under cover are in process of construction. There will be five buildings eventually.

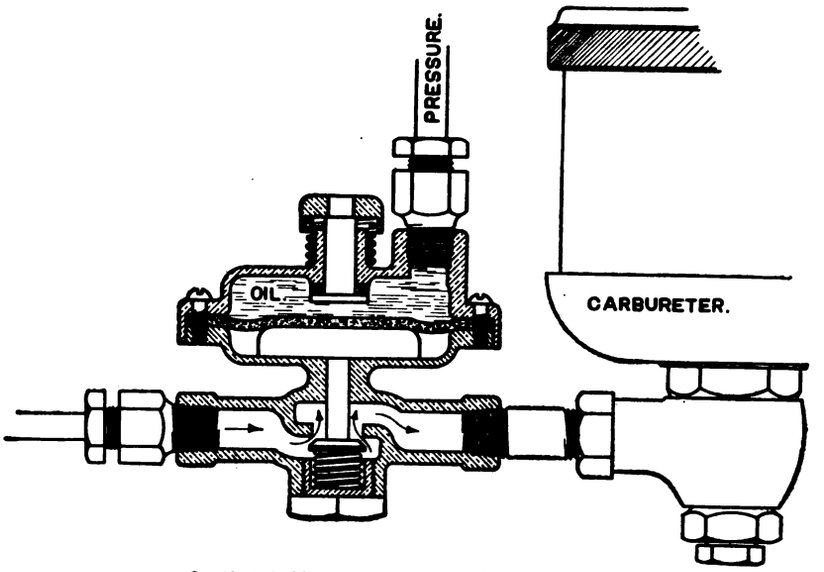
When Lubrication Fails

The Pierce Corporation of Anderson, Indiana, maker of the Pierce engine governor, has announced a new device, called the Lubri-Tector, designed for the purpose of protecting the engine from the results that follow a failure of lubrication. The Lubri-Tector is a small but carefully designed device that gives absolute protection against burnt-out bearings and scored cylinders. It also prevents gasolene leakage and the disastrous fires that so often result.

Only a few minutes are required to install the Lubri-Tector on any internal-combustion engine with a pressure lubricating system. The cost is neglibible and there is nothing to wear out or need replacement. Its use lengthens the life of the engine and avoids expensive repair bills.

As shown in the illustration, the Lubri-Tector is installed as close to the carbureter as possible. The oil line is cut, a tee inserted, and the line from the tee connected to the opening in the top of the device. Just as long as the engine is running and the lubricating system functioning properly, the oil pressure exerted against the diaphragm of the Lubri-Tector will keep the valve in the gasolene line wide open. But let the oil supply run low or the pump fail, the oil pressure ceases and the gasolene valve closes immediately, stopping the engine until the trouble is remedied. And when the engine is voluntarily stopped by the driver, the valve in the gasolene line automatically closes until the engine is started again, preventing gasolene leakage.

Since one-third of Iowa's highway fatalities occurred last year at railroad crossings, the Iowa State Highway Commission has designated 416 grade crossings for improvement. Two hundred and ten of the danger spots have already been reconstructed. In thirty-five instances overpasses or underpasses have been built.



Sectional View of Pierce "Lubri-Tector."

The Expert Method of Buying Power Wagons

¶ Read the best available literature upon the subject of motor wagon transportation.

¶ Make sure that it is prepared by an impartial and competent authority.

¶ Don't be in a hurry to know it all.

¶ You will be a wise buyer if you read the "Power Wagon"—an indifferent one if you don't.

¶ If you know of anyone who is thinking of purchasing machines, give him the address of this paper. It is the most enlightening journal of its kind published.

THE POWER WAGON Chicago

A dual-valve engine uses less gas and delivers more power than any other type of engine.

Pierce-Arrow
TRUCKS

The Pierce-Arrow Motor Car Company
Buffalo, New York

2-ton $3200 3½-ton $4350 5-ton $4850 fully equipped

Please mention "Power Wagon" when writing to advertisers.

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DENBY
MOTOR TRUCKS

Model 33, 1½-2 Ton Bus

Operated by

STAR TRANSPORTATION COMPANY
MASON CITY, IOWA

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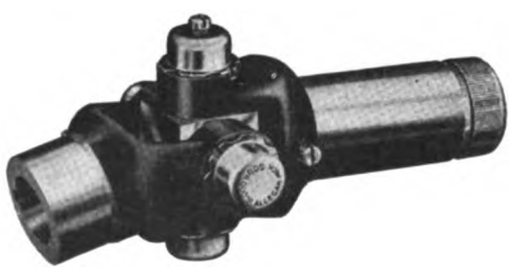
Denby Motor Truck Company
DETROIT, U. S. A.

BLOOD-BROTHERS
Oil Lubricated
Universal Joints



"STAY PUT"

More than thirty-five leading automobile truck and tractor manufacturers have definitely solved their universal joint problems by using this trouble proof joint as standard equipment. It will pay you to

INVESTIGATE

Blood-Brothers Machine Co.
Pioneer Builders of Universal Joints

ALLEGAN — F. Somers Peterson Co. San Francisco, Cal. Western Representative — MICHIGAN

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American-La France Fire Engine Company, Elmira, N. Y.

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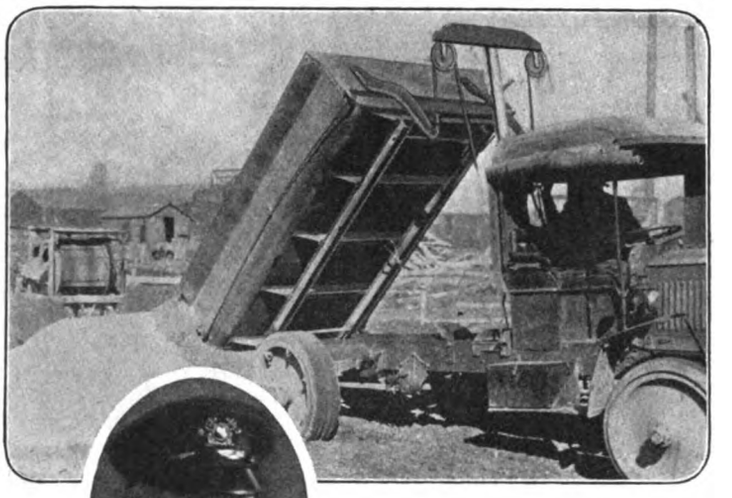

Gar Wood Says:

"Speed, continuous, certain, dependable—can come only from a perfect mechanism. This is true of hoists as well as boats."

Gar Wood

Built by Gar Wood

BUILDING cost would be higher today were it not for Wood-Detroit Hydraulic Hoists and Steel Bodies. For in excavating, in hauling sand, gravel, plaster, cement and other supplies these hoists are reducing transportation costs.

WOOD DETROIT

Hydraulic Hoists and Steel Bodies

Universal use, the endorsement of over 90% of the truck makers, and the record of success of the last decade all attest the superiority of this equipment.

Let us tell you the best Wood-Detroit units for your chassis and your work. We'll do this gladly.

Wood Hydraulic Hoist & Body Co.

7924 Riopelle Street Detroit, Michigan

Sales and Service in All Principal Cities

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From the User's Standpoint

"HAVE USED from 26 to 30 different trucks on various road jobs, but have found no truck to compare with my 14 Macks for performance, service and low up-keep."—C. G. Sigwald, 2875 Irving Ave., Minneapolis, Minn.

"For power, economy, reliability and ease of operation in difficult places no truck compares with the Mack."—M. J. Oldham, 236 Brush Creek Blvd., Kansas City, Mo.

"Have been using trucks for six years. Last two years have used Macks exclusively. Have found their service far superior to any others."—D. D. Dockety, 635 Maryland Ave., N. E., Washington, D. C.

WHAT MORE CAN BE SAID

Possibly there is some territory available for a Mack franchise in your vicinity. Write today.

INTERNATIONAL MOTOR COMPANY
25 Broadway, New York City

Capacities: 1½ to 7½ tons.
Tractors to 15 tons.

Mack TRUCKS

Branches owned by this Company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

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Investigate LATEST "WHITNEY"

LATEST ROLLER CHAINS HAVE SPECIAL QUALITY SOLID ROLLS AND OTHER IMPORTANT IMPROVEMENTS

HIGH EFFICIENCY
ROLLER AND SILENT TYPE
CHAINS
also *Low* Cost per *Thousand Miles* of Service

Front End Motor Chain Drives

EXCEPTIONAL MILEAGE AND NEVER KNOWN TO SKIP THE SPROCKET TEETH

THE WHITNEY MFG. CO.
HARTFORD, CONNECTICUT, U. S. A.

Road Building Fleets

This fleet of twenty 3-ton trucks equipped with Heil Bodies and Hoists is considered the best equipped fleet engaged in road work in Minnesota this season.

The bodies are Model SSC, each fitted with double acting tail gate, a gravel spreading device and sliding bottom in the floor so that wet concrete will dump out easily.

A long stroke No. 4 Hydro Hoist is used to dump the load which takes from 15 to 30 seconds. The Hoist is direct acting, all the power being delivered at the right place.

DEALERS: You will find a very satisfactory margin in selling Heil Equipment. Write for prices and discounts.

THE HEIL CO.
1140 Montana Ave. Milwaukee, Wis.
Distributors—Chicago, New York, San Francisco, St. Paul, Cleveland, Richmond, Pittsburgh, Washington, D. C., Sioux City, Ia.

BROWN-LIPE-GEAR
TRANSMISSIONS
CLUTCHES CONTROL SETS

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DIFFERENTIALS
DRIVE GEARS DRIVE PINIONS

Both at Syracuse, N.Y.

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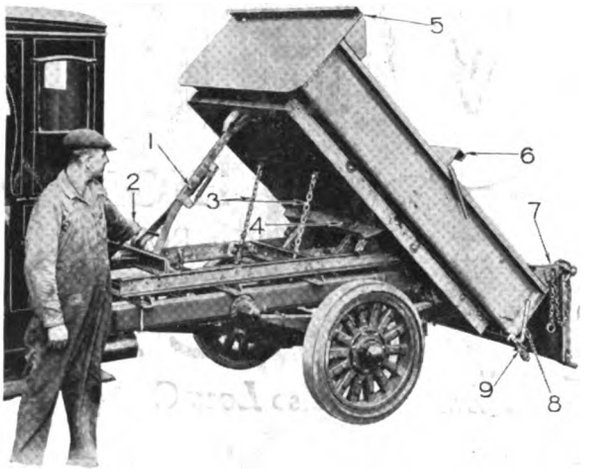
NO HOIST

DUMPS WITHOUT POWER



AUTOMATIC

DUMPS BY GRAVITY

LEE AUTOMATIC GRAVITY DUMP BODY

The patented roller segment on which the body rolls, determined by clever application of force working by laws of gravitation, cause the body and load to roll backward and down grade when dumping. This action is so worked out that the path of the center of gravity is downward instead of upward as in the case of mechanically lifted bodies. The center of the load is carried well forward of the rear axle, which is in conformity with manufacturers' desire for proper load distribution. The over-all height is as low as bodies of the same size equipped with hoisting devices.

Eliminates Truck Trouble

Eliminate half the total truck delays by eliminating the Hoist and its numerous and complicated parts that are subject to improper installation, adjustment, and wear, due to road shocks, vibration, dust, exposure to weather, etc., etc.

Increase Daily Tonnage

Increase the daily tonnage of your trucks by hauling larger pay loads. (On account of light weight equipment). Haul more loads per day by using a more reliable unit. Free from intricate, delicate, hoisting machinery. Answers every purpose of a dump truck equipped with any type hoisting device.

Save 40%

The first cost of a Lee Automatic body is about 40% less than a body with power driven hoist. May we send you our bulletin No. 78 that gives prices and comparison of cost?

LEE TRAILER & BODY CO.

2343 S. La Salle St. **Chicago, Illinois, U. S. A.**

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POWER WAGON

NUMBER 214 CHICAGO, SEPTEMBER, 1922 Price 25 Cents

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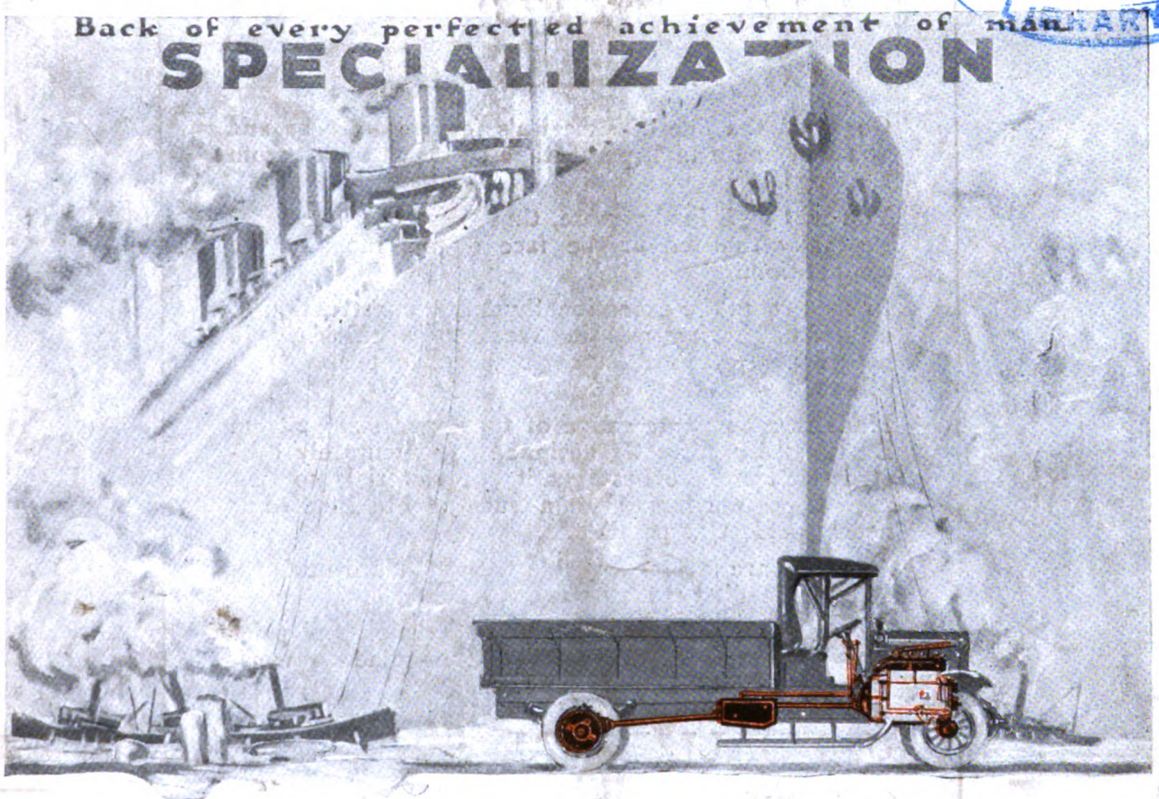
Back of every perfected achievement of man

SPECIALIZATION



S. S. MAJESTIC—The world's largest ship. 956 feet long. 100 feet wide. 9 decks. 48 boilers. 240 furnaces. Quadruple screws. 100,000 horse-power. Capacity 4,100 passengers.

The *S. S. Majestic* is the achievement of literally thousands of engineering firms, contractors and sub-contractors each a specialist in a particular line.

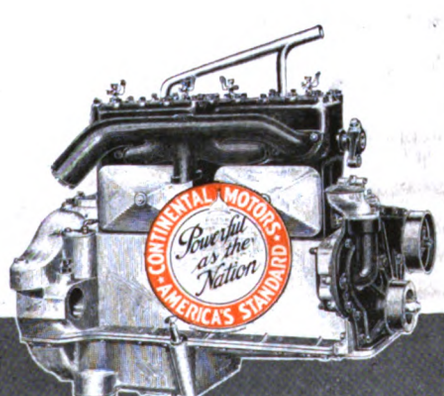
What the SPECIALIZED truck actually gives the purchaser

Shippers of merchandise upon the *S. S. Majestic* are conscious of a feeling of absolute reliance born of the knowledge that each vital part of the great ship is the product of a highly specialized marine, mechanical or electrical engineering force—each fitted to solve *one* problem *well*.

Purchasers of SPECIALIZED trucks are conscious of a similar feeling of absolute reliance born of the knowledge that each performing unit of their truck—motor, transmission, universal joints, axles, clutch, etc.—is the product of the infinite skill of a specialized unit manufacturer fitted to make *one* unit *well*.

Identify your organization with a SPECIALIZED truck because it is the vehicle the public trusts. It is the vehicle they buy. It is the vehicle that gives the most that money can buy in the automotive industry. It is the truck whose uninterrupted performance is assured by convenient parts-distributing stations throughout the world.

Remember this:—the certain identification of *motor* specialization is—the Continental Red Seal.



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Offices: Detroit, U. S. A. *Factories: Detroit and Muskegon*

Largest Exclusive Motor Manufacturers in the World

Continental Motors

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Double-row, maximum type, radial bearing

Double-acting, self-aligning thrust bearing. 2100 Series

Double-acting, self-aligning thrust bearing with leveling washers. 2100-U Series

Single-acting, self-aligning thrust bearing, leveling washer. 1100-U Series

Double-acting, thrust bearing, flat seats. 2100-F Series

Double-row, deep-groove Conrad type, radial bearing

Strom BEARINGs

The Bearings Used in High Grade Trucks

Go down the line of America's foremost trucks and you will find a high percentage equipped with Strom Bearings.

You will find, furthermore, that these bearings were generally selected in the face of the most severe competition.

In such cases the exceptionally sturdy construction of a Strom Bearing and its remarkable efficiency in actual performance have singled it out above all others.

Made in a complete range of types and sizes, Strom Bearings are correctly designed and accurately constructed from the best quality of materials so that their important function in a truck may be fulfilled as nearly perfect as possible.

And they are interchangeable with standard bearings of other leading manufacturers.

If you wish, we shall send you a catalog and price list. Our staff of engineers will be glad to work with you on any bearing problem.

U. S. BALL BEARING MFG. CO.

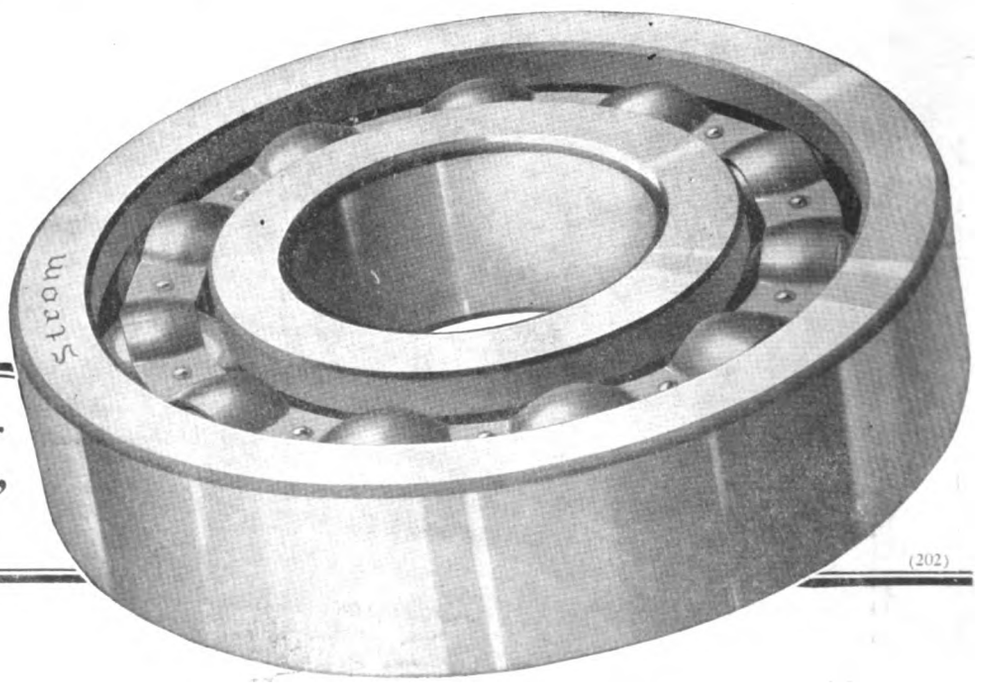
(Conrad Patent Licensee)

4590 Palmer Street **Chicago, Illinois**

Single-row, deep-groove Conrad type, radial bearing

Angular contact bearing —combination radial and thrust

Single-row, maximum type, radial bearing



—used "Wherever a Shaft Turns"

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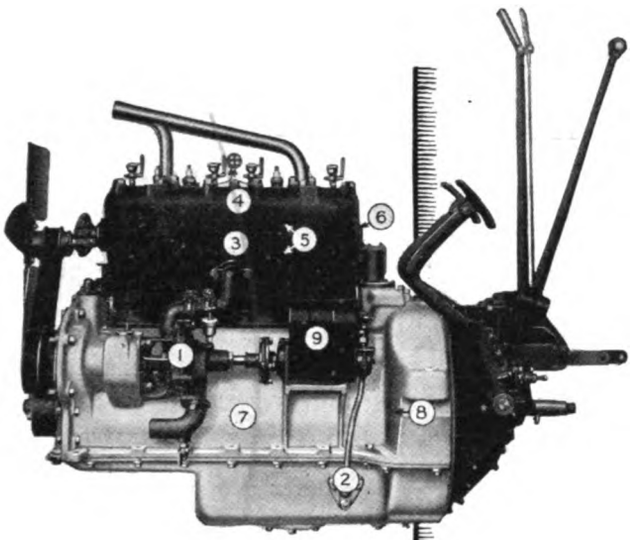
Specialized Truck Building Practice Insures the Superior Performance of the



FEDERAL Fast Express

1 Centrifugal pump circulation, with scientifically designed water jackets, insures ideal and uniform cooling of motor at all times.

2 Gear driven oil pump with steel lined main and auxiliary oil passages to all bearings insures continuous and proper lubrication of all moving surfaces; reducing friction, minimizing wear and promoting quiet.

3 The four gray iron cylinders are cast en bloc, of uniform metal thickness.

4 The gray iron cylinder head is removable, making it easy to scrape carbon or grind valves. It is held firmly and evenly against the copper asbestos gasket by 18 studs. Four lifting lugs simplify its removal.

5 Throughout this sturdy Continental engine all reciprocating parts are of sufficient size for heavy duty work, but not too heavy for accurate balance and quiet operation.

6 The inlet and exhaust manifolds are grouped in a single casting. Its unique design with an adjustment, insures correct temperature at all seasons of the year.

7 The aluminum crank case is designed and built to insure a surplus of tensile strength with light weight.

8 The crank shaft is scientifically designed, highly refined and perfectly balanced. Special machinery attending every part of its manufacture eliminates all possibility of distortion and misalignment.

9 The Eisemann magneto, insuring a hot spot at all times, provides a most efficient and dependable system of ignition.

Note the sturdy truck-type engine of this new Fast Express. Similarly designed for maximum strength and enduring service is its Timken Worm and worm-wheel drive; its staunch transmission; its heavy Borg & Beck clutch; its reliable Gemmer Steering Gear.

The frame is five inches deep; the springs are of chrome vanadium steel; the brakes are fifteen inches in diameter; the propeller shafts are unusually large; five inch tires are standard equipment.

It is these exclusively Federal features that make the Fast Express superior for the rapid, certain and economical transportation of light-delivery load. *Compare it*—and you will *buy it.*

FEDERAL MOTOR TRUCK CO.
Detroit, U. S. A.

Another **FEDERAL**

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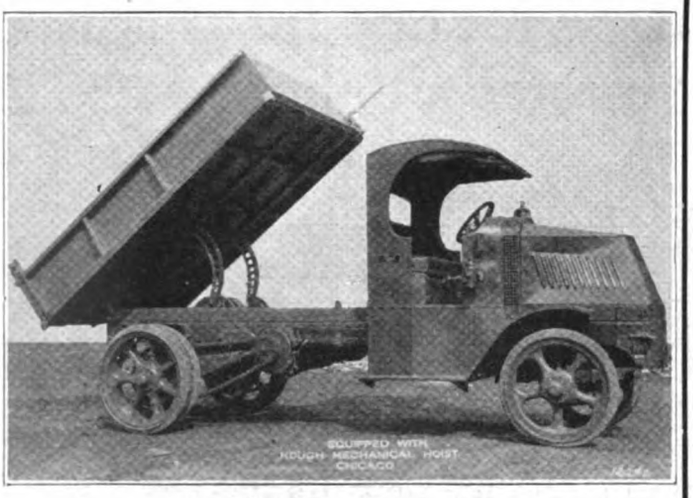

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An exponent of the most enlightened thought and practice of the motor truck industry.

Published monthly by

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THE POWER WAGON PUBLISHING COMPANY

WALTER WARDROP, *President and General Manager*
STANLEY A. PHILLIPS, *Vice-President and Editor*

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W. C. COFFEY, Western Representative

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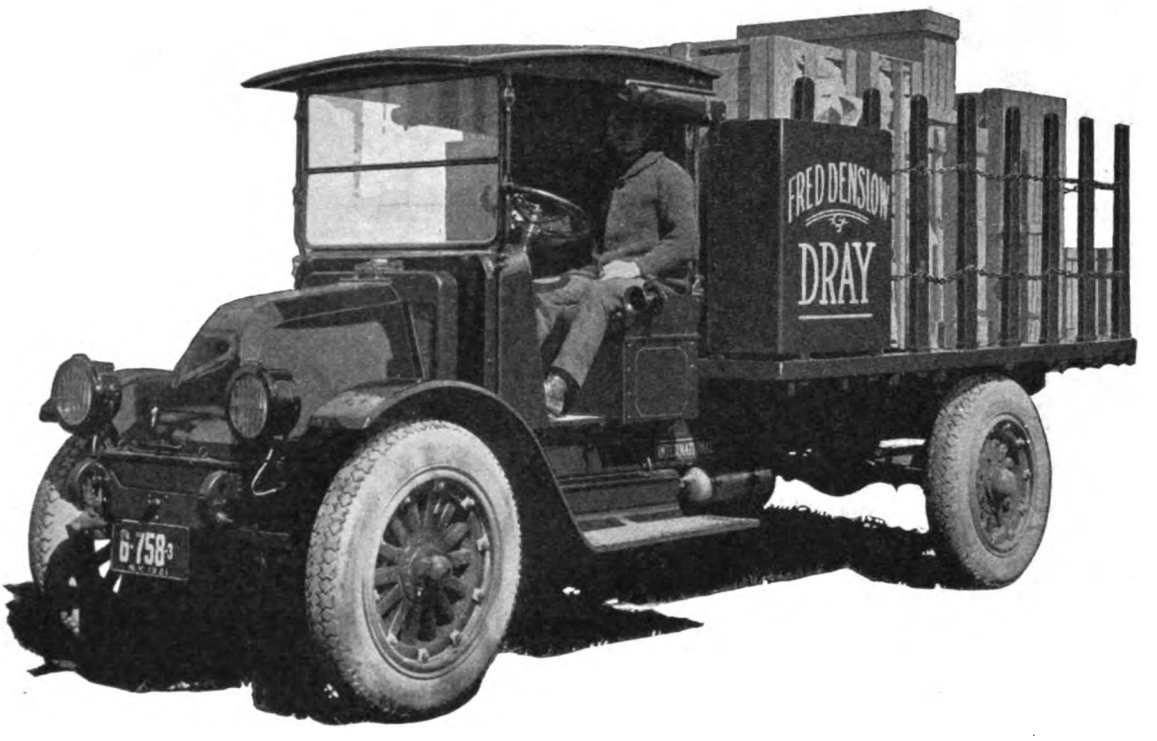
INTERNATIONAL MOTOR TRUCKS



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EVERY purchaser of an International Motor Truck is given a Free Inspection Service Policy which guarantees inspection of the truck by a factory-trained road engineer four times a year. Not merely for the first year, nor the second, but for the life of the truck.

This Plan gives the International Motor Truck dealer a distinct advantage, and makes the International Contract an unusually valuable franchise. For two years the Company, the dealer, the owner, and the driver have been working under this Plan for greater service and increased satisfaction. They have a common interest, and each in helping the others helps himself.

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OF AMERICA
(INCORPORATED)
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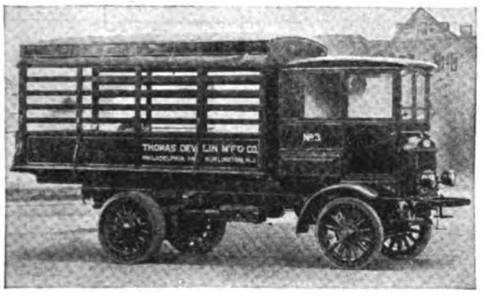
4-cylinder, 2 to 3 ton Autocar; 138-inch wheelbase; unladen chassis weight only 5350 pounds; chassis price, $3075



4-cylinder, 4 to 6 ton Autocar; 120" wheelbase; unladen chassis weight 7200 lbs.; chassis $3950

4-cylinder, 2 to 3 ton Autocar; 114" wheelbase; unladen chassis weight 5200 lbs.; chassis $2950

2-cylinder, 1½-2 ton Autocar; 120" wheelbase; unladen chassis weight 3700 lbs.; chassis $2050

2-cylinder, 1½-2 ton Autocar; 97" wheelbase; unladen chassis weight 3600 lbs.; chassis $1950

What a motor truck buyer wants to know

1 With whom he is personally dealing
2 Responsibility and experience of manufacturer
3 Trade in, rebuilding and reconditioning policy
4 Design and mechanical superiority
5 What size and weight truck he needs
6 What load he can legally carry
7 Insurance and license expense
8 Necessary gas and oil consumption
9 Cost of replacement parts
10 Assurance of immediate service

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continuous economical transportation

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POWER WAGON

Vol. XXIX. CHICAGO, SEPTEMBER, 1922. No. 214.

Californias' 'Buses Earn More Than Motor Trucks

ONE LINE'S REVENUE IS $1,618,893

Motor passenger stage revenue in California far exceeds the earnings of common carrier freight motor truck lines, according to figures gathered by the California Railroad Commission and believed by its accountants to be the most comprehensive survey of the motor transportation situation yet made in any state.

Out of a combined revenue from passengers, freight, express and other sources of $14,831,179 for 1921, passenger earnings totaled $7,991,312 and freight $3,408,152. Accuracy is not claimed for these figures, as the motor transportation business has not been conducted systematically, and the railroad commission accountants found that many reports were merely estimates, while others were filled with such mistakes as charging new equipment to operating expense instead of capital account. Nevertheless the figures are reasonably reliable.

Twenty-three stage lines showed gross earnings over $50,000, one company taking in over $1,000,000 and three others over $250,000. Total revenue for the 2 lines was $5,544,515, expenses, $5,462,750; net, $81,765. These companies reported an investment equipment of $2,588,424.

Twenty freight and express lines had revenues of over $50,000. Their total revenue was $2,060,530, expenses, $1,196,997, and net, $863,533. Equipment investment was $683,915. Though they apparently showed a greater net return than the stage lines, a large proportion of these truck lines are of comparatively recent origin and only one of them had a gross revenue of over $200,000, while the stages have a history of steady growth and consolidation, a few of them now dominating the passenger business in the state.

The largest stage line is the Motor Transit Company, which operates a network of routes out of Los Angeles. Its gross revenue was $1,618,893, while the California Transit Company, dominating the Sacramento and San Joaquin valleys, took in $834,295.

As a uniform system of accounting has been provided by the railroad commission by which all books for 1922 must be kept, it is expected the 1922 reports will give a fairly accurate idea of the profitableness of public utility motor transportation. The commission is empowered to regulate the service of the motor truck carriers and has control over their rates and their issues of stock.

21,243 Trucks Made in July

Figures received by the Department of Commerce show that the production of both passenger-cars and trucks declined in July, compared with May and June. The following table gives the total production for the last seven months by all companies whose reports have been received. With a few exceptions, the reports each month are from identical firms and include approximately 90 passenger-car and 80 truck manufacturers.

The figures for July are subject to slight revision when all reports have been received.

1922.	Passenger-cars.	Trucks.
January	81,693	9,344
February	109,170	13,121
March	152,959	19,651
April	197,221	22,227
May	*232,431	23,803
June	*263,017	*25,985
July	223,201	21,243
Totals	1,259,692	135,374

*Revised from last report.

Rail Strikers May Man Motors

Railroad strikers in Washington will set a precedent which may have a far reaching effect upon the use of motor trucks during the transportation emergency. The strikers volunteered to operate trucks hauling fuel and food supplies in order that the public itself and their own families would not suffer from the tieup of railroad lines. It is said that the committee representing the strikers in the Washington territory have agreed to assist the Merchants & Manufacturers' Association in the establishment of truck trains to haul coal and provender from points in an extensive radius.

The question arises as to the action which national labor leaders may take in the event the proposed program of of local strikers is carried out. The radical element among the union men may insist that the strikers refrain from manning motorized trains, in as much as the uninterrupted movement of essential commodities even on a smaller scale may have a tendency to break the strike.

Trade in California

Truck business in California continues good, according to the record shown by state registrations. During the month of July 1,685 trucks were sold in the state, 894 in the northern part and 791 in the southern part. The total for the month shows an advance of 87 per cent. beyond the record for July of 1921. In the same month of this year passenger-car sales reached 13,011 for the state, 6,096 for the 47 northern counties and 6,915 for the 11 southern counties. Fresno County showed the greatest gain in sales over the same month of 1921, its gain being 110 per cent., while San Diego County was next with an advance of 90 per cent. In Los Angeles County the gain was but 56 per cent. and in San Francisco County only 17 per cent.

Durant Acquires One-Ton Truck Plant in Michigan

MAY MAKE TWO-TON MODEL LATER

The Mason Motor Truck Company, Flint, Mich., has been added to the growing string of Durant's associated companies. The truck, a 1-ton speed type known as the Mason Road King, will be produced at Flint and at the Locomobile plant at Bridgeport, Conn., another of Durant's recent acquisitions. While only the 1-ton job is announced, it is understood that a 2-ton truck to be styled the Twoton, will be added to the Mason line.

The Mason truck was originally started late last year and in February the Mason Motor Truck Company was organized in Flint. The designer of truck and founder of the company was A. C. Mason, whose manufacturing connections with the industry date back to the time of the old Cadillac. Mr. Mason is accredited with having built the first engine put into a Buick car. Subsequently he developed the Chevrolet "FB" and '490" engines and the Samson tractor, and served as a consultant to General Motors until last December.

The Mason Road King chassis is priced at $1,200, f. o. b. Flint. With the chassis, stake, delivery and bus boddies will be offered. It is said to have a traveling range in excess of 40 miles an hour. The gear reduction is 4.9 to 1, but the special ration of 5.5 to 1 will be available for hilly country.

It is powered by a 4-cylinder engine, said to develop 35.4 horsepower, has a 131-inch wheel base, with frame hung low for road ability, and is carried on 4x5 cord tires as standard. Electric starter, electric lights and horn are regular equipment. Weight of chassis is given at 2,950 pounds.

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Post-Office Uses Motor Truck Service in 344 Cities

EQUIPMENT COMPRISES 4,115 TRUCKS

The Post-Office Department is ready to move the mails with motor trucks if railway service should fail through impending strikes. This fact was brought out by Harry H. Billany, fourth assistant postmaster general, in discussing the possibility of using motors for long-distance mail delivery. In addition to the government's facilities for handling the mails with post-office, war department and agricultural department trucks arrangements have already been made by which, in the event they are needed, privately owned trucks will be pressed into service. To this end the department has prepared a survey of the country's motor transport facilities and postmasters have been instructed to secure the necessary trucks immediately the train service is interrupted. Terminals have been designated and routes laid out in accordance with the suggestions of the postmasters in each district.

"Twenty-five, twenty, or possibly ten years ago, the prospects of a nation-wide railroad tie-up would have meant a complete tie-up of the United States mails," Mr. Billany said. "To-day, to the best of our judgment, it will mean not more than a 50 per cent. delay in first and second class mails. But the big thing that we are interested in and that we shall be able to put over, thanks to the automobile industry, is that the mails will be delivered. There will be no stopping the mails. Ten thousand trucks are now standing idle, figuratively speaking, with their engines tuned up, awaiting to see what will be the outcome of the nation-wide threatened strike. Within an hour after the last passenger train is tied up the trucks will be on the highways, loaded with mail, running on schedule between terminals that can be reached within a day's ride.

"To date the movement of the mails has not been hampered to any great extent, except in some of the western states, where the roads were no doubt anxious to get an excuse to cease operation because of their heavy expenses. In these instances the department has put into use several hundred mail trucks, and the success of these is what has led us to an optimistic viewpoint of the pending strike, and on which we base our opinion that the mails will not be slowed down more than 50 per cent."

Republic Business Good

Positive evidence of rapidly improving business conditions is reflected in the volume of sales now being enjoyed by the Republic Truck Sales Corporation, Alma, Michigan, according to Frank E. Smith, president. "From a sales standpoint, June was our best month in two years," says Mr. Smith, "and during the first six months of 1922 we sold more Republic trucks than during the entire year of 1921."

More than 3,000 drivers were sent to jail by the traffic Court in New York in 1921.

Senate Asks for Fuel Prices

Further assistance has been asked from the National Automobile Dealers' Association by the U. S. Senate Committee investigating the gasolene price situation in a letter from Gilbert A. Roe, attorney for the Senate Committee on Manufacturers, to C. A. Vane, general manager of the association. Recently the dealer association laid before the committee data showing average prices for twelve months in 28 cities selected at random throughout the country and in which a wide discrepancy existed as to retail gasolene prices.

Cousel Roe of the Senate Committee has now asked the dealer association to provide him with similar information for the same cities for the year 1920 and the first half of 1921 which, with the information already supplied by the N. A. D. A., will give a check on prices for virtually the last three years.

Since charges were made by the N. A. D. A. to the Senate Committee and to the Federal Trade Committee that gasolene prices had been "juggled" there has been a general reduction in gasolene prices of about 2 cents for practically the whole country. Considering this as a country-wide influence this means that a saving has been effected for motorists amounting to substantially $75,000,000. Motor clubs throughout the country have quite liberally credited the saving to the N. A. D. A. campaign.

General Manager Vane has offered the entire facilities of the dealer organization to the Senate Committee investigating the gasolene price situation and has advised Counsel Roe that when hearings are begun the N. A. D. A. will present witnesses who will offer additional evidence that an understanding exists in the oil trade amounting practically to a combine to elevate the cost of motor fuel.

Fuel Price Cut Saves $73,500,000

Motor owners of the United States are more than seventy million dollars richer as a result of the recent 2-cent cut in the price of gasolene. Estimates of fuel consumption per motor vehicle range from 350 to 450 gallons annually. Taking the former figure, which was estimated from U. S. Bureau of Mines reports on total domestic consumption, the saving to each owner on a 2-cent cut is $7.00 annually, and to the motoring public, which numbers 10½ million, the saving is $73,500,000. A reduction in gasolene prices is particularly beneficial to the farmer who not only owns one-third of the motor cars, but also uses 2,000,000 gasolene-consuming stationary engines.

Acason in Receiver's Hands

The Acason Motor Company, Inc., of Detroit, has been placed in the hands of Val. H. Kendall as receiver pending adjudication in bankruptcy proceedings instituted by merchandise and bank creditors in the Federal Court there. An appraisement of the assets of the company is now being made by the receiver. The company is declared to have a considerable number of orders on hand and accounts receivable on its books of $58,000.

12,945,528 Motor Vehicles in Use Throughout World

CANADA AND BRITAIN NEXT AFTER U. S.

World motor vehicle registration has nearly reached 13,000,000, according to the Akron Chamber of Commerce, which has been compiling figures up to June 30 of this year. Next to United States, which is far in the lead, Canada and Great Britain show the largest number of machines in use.

An examination of the table reveals the fact that every country, save only Austria and Russia, registered an increase in motor vehicles during the years 1919 to 1922. Russia's motors in use dropped from 15,000 to 10,000, while statistics for Austria record a shrinkage from 19,300 to 10,474.

The little country of Denmark led all others in the percentage of increase in registrations though not, of course, in numbers. The increase from 7,000 to 22,000, being more than 200 per cent, is nearly matched by the growth in Argentina, where something less than 200 per cent increase was reported in the growth from 26,500 to 72,206. Australia came third with 150 per cent more cars in 1922 than in 1919. In numbers of increase, Great Britain led, saving the United States, with 208,600 more cars now than three years ago.

The following table compares the registration December 31, 1919, with June 30, 1922:

	1922.	1919.
Great Britain	463,600	255,000
France	235,948	202,000
Germany	91,390	75,000
Canada	463,848	336,854
Algeria	12,000	9,000
Argentina	72,206	26,500
Australia	84,900	27,000
Austria	10,474	19,300
Belgium	36,000	12,000
Brazil	18,500	12,500
British Africa	36,500	16,300
Cuba	32,000	22,000
Denmark	22,000	7,000
Dutch East Indies	18,000	12,500
Hawaii	12,500	6,500
India	45,680	18,680
Italy	53,600	35,500
Japan	12,260	5,000
Mexico	25,500	16,500
Netherlands	20,000	20,000
New Zealand	37,500	25,000
Norway	11,122	5,013
Philippines	13,341	5,067
Russia (in use)	10,000	15,000
Spain	30,000	14,850
Switzerland	18,011	14,000
Uruguay	12,500	5,800
Venezuela	3,500	2,000

The exact total of the above, together with the figures for the United States, is 12,945,528 for 1922 and about 11,200,000 in 1919, an increase of something over a million cars. Commenting on the tabulation, the tire makers see a 1923 market for their products of about 50,000,000 units, at least, in consideration of the world trade.

Supreme Motors Has Receiver

N. A. Wolcott of Warren, Ohio, has been appointed receiver of the Supreme Motors Corporation of Warren by Federal Judge D. C. Westenhaver of Cleveland. The appointment was made on the application of the Trumbull Manufacturing Company, Park Hardware Company and Aetna Foundry Company, Warren, concerns which sold materials to the corporation.

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Overloading Commonest and Greatest on Heavy Machines

NEW YORK HIGHWAY DEPT. FINDINGS

The motor truck regulatory bill became a law in New York on April 7 and on April 11 the highway department placed inspectors with loadometers in Westchester County and started the weighing of trucks in an effort to stop overloading. At a later date these inspectors were transferred to Nassau County where more arrests were made. In the period from April 11 to June 10, 178 arrests for overloading were made; 14 arrests for bad tires, several hundred for having no mirrors and one for excess width of body.

Through the courtesy of the Commissioner of Highways Herbert S. Sisson, figures have been furnished showing the capacity of the truck and the number of arrests made of each capacity, divided by the overload on rear axle in pounds, showing that the trucks which had the greatest percentage of overloads were those of 5 and 5½-ton capacity, the next principal offender being the 7 and 7½-ton.

About June 12 the highway department placed seven other inspectors equipped with weighing devices, on the road so that there are now eight crews out in different parts of the state stopping and weighing trucks.

It is expected that a vigorous campaign of this character will be continued permanently until the very prevalent practice of overloading is stamped out, as it is bad both for the truck which carries the overload and the highway over which the truck operates.

It is also against public policy that a small number of people who constantly overload their trucks for the purpose of making greater profits per load should be allowed to continue to do so thereby making it impossible for the vast majority of law abiding truck operators to carry the load allowed by the state with a profit in competition with those who constantly overload, as this is just another form of price cutting.

Commissioner Sisson is firm in his intention to reduce to the minimum this form of violation of the law and in his actions has the support of the community at large. Following is a table showing how the overloads were distributed:

Truck Capacity.	Number of Arrests.	Overload on Rear Axle in Pounds: 500 to 1,000	1,000 to 2,000	2,000 to 3,000	3,000 to 4,000	4,000 to 5,000	5,000 to 6,000	6,000 to 7,000	7,000 to 8,000	Bad Tires.
Under 1-ton	..	..	..	..	..	..	..	..	..	..
1-ton	2	..	..	..	..	..	..	..	..	2
2-2½-ton	18	3	7	3	2	..	..	..	..	3
3-3½-ton	19	4	4	2	3	2	2	1	..	1
4-4½-ton	6	1	..	1	1	..	..	1	..	2
5-5½-ton	69	10	15	23	6	6	3	1	3	2
6-6½-ton	24	8	6	1	4	3	..	2	..	..
7-7½-ton	54	9	11	7	6	4	5	6	2	4
Totals	192	35	43	37	22	15	10	11	5	14

Shifting of load and removal required when greatly overloaded: Average exceeds 20 per cent. maximum 57 per cent.

Republic Refinancing Plan

Financial interests in the Republic Motor Truck Company have under consideration a reorganization plan which would eliminate the present bank debt of about $1,500,000 and supply upwards of $1,000,000 new working capital. The terms are rather drastic, however, and some modifications may be made.

Under the plan a New York brokerage house has agreed to supply $800,000 cash and take a 15-year first mortgage on the property. Holders of $2,500,000 three, four and five-year 7 per cent. notes outstanding will be asked to surrender them in exchange for $600,000 7 per cent. 16-year notes and $1,900,000 par value preferred stock. Banks will take preferred stock for the full amount of their claims, and merchandise creditors with claims prior to February 15, 1922, will be invited to take preferred stock in settlement.

Holders of present $826,200 $100 par value preferred stock will be asked to subscribe to new common, probably at $7 a share, on a share for share basis. For each share purchased an additional share will be given as a bonus. Holders of present 100,000 shares of no par common will be asked to subscribe for new common at $7 a share, also on a share for share basis without any bonus.

The brokerage house supplying the $800,000 cash probably will receive a block of new common stock as a bonus. This firm has thoroughly investigated Republic and is convinced that with sufficient working capital the company can be operated on a profitable basis. It believes that within a few years the stock will have advanced to the point where it can be disposed of at a good profit. This view appears to be shared by a number of banks who have signified willingness to take preferred stock in settlement of their claims.

Boulden to Direct Industrial Motors

H. T. Boulden, vice-president of the Selden Truck Corporation, has been appointed sales director for the Industrial Motors Corporation. He will be in full charge of that department for both Selden and the Atlas Truck Corporation interests. Allan Cosgrove will continue in charge of manufacturing for the Atlas corporation.

In addition to announcing the Boulden appointment. the Industrial Motors made plain that policies of the consolidation would be directed by a centralized committee. Frederick M. Small of the Martin-Parr Corporation, Cosgrove of Atlas, George C. Gordon and Boulden of Selden will serve on this body.

The management of the Tennessee, Alabama & Georgia Railroad has announced that gasolene-propelled cars will be placed in service on the system. The first one will be in operation about September 1, to be followed by others if proved satisfactory.

5,917 Firms Operate 51,811 White Trucks in Big Fleet

15 INVESTED OVER $20,000,000 EACH

An idea of the big growth of motor truck transportation the last decade is gleaned from statistics recently compiled by the White Company. This company has been manufacturing gasolene trucks for about thirteen years, but it is only in the last six or seven years that production and use of the motor truck has reached large proportions.

The first if this year, 506 owners were operating 18,527 White trucks in fleets of ten or more. The same owners twelve years ago were operating the insignificant number of 60 trucks. The great majority, of course, did not use motor trucks in 1910. A few operated one or two. There is just one outstanding exception and that is W. & J. Sloane, the well known New York furniture and carpet merchant. This establishment in 1910 was operating 13 Whites. Today this pioneer fleet has grown to 31.

The owner of the largest individual fleet on the White list is the Gulf Refining Company, with 1,177 trucks, representing an investment of more than $3,000,000. The Gulf Refining Company did not operate trucks in 1910, but purchased one the following year. In 1914 the company had 81 trucks in service and since then has added from 100 to 200 trucks to its fleet each year. A few of the other large fleet owners are the Associated Bell Telephone Companies with 806; the Standard Oil Company of New York, 649; Union Oil Company of California, 534, and the United States Postoffice department, 665.

In addition to the users who operate fleets of 10 or more there are 5,411 owners operating fleets of less than 10, totaling 33,284 trucks, making a grand total of fleet owners of 5,917 and the number of trucks they operate, 51,811. There is a host of owners who do not operate fleets.

Another interesting angle of the White Company's tabulations is that 15 owners have invested more than $20,000,000 in Whites. The total value of all Whites on the road is well in excess of $180,000,000.

Watson Receivership Ended

Federal Judge Ray of Syracuse has authorized the reorganization of the Watson Products Company of Canastota and ended the receivership which has been in effect about two years. The Watson Truck Company is the name of the new concern. The indebtedness of the old company will be met by giving first preferred stock in the new concern to all creditors with claims of more than $1,000. The creditors accepted the stock proposition.

The report of Kirk B. Delano, receiver, will be formally received by the court September 21. The company, with an indebtedness of $550,000, has been manufacturing motor trucks under the receivership, and business is reported to have shown a decided improvement of late.

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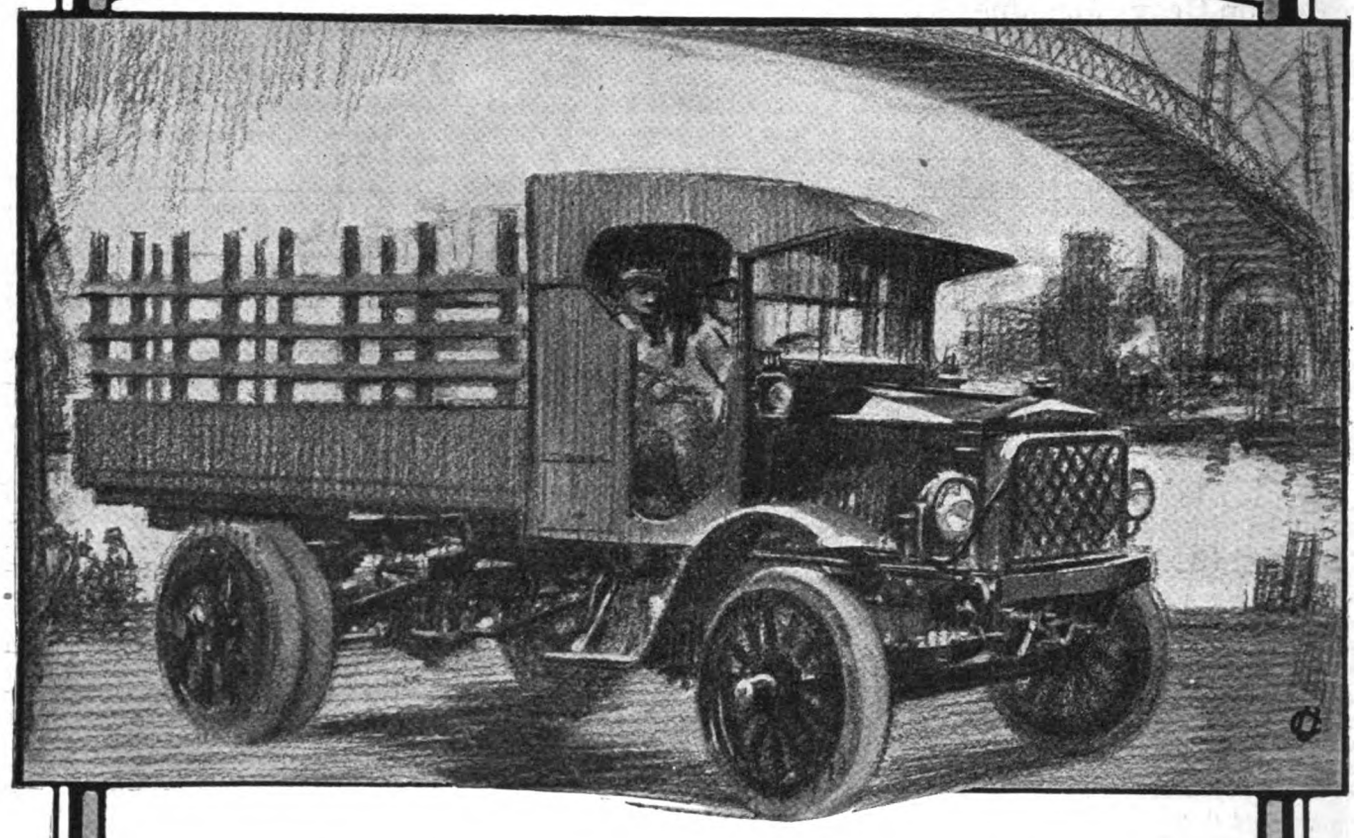

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An exponent of the most enlightened thought and practice of the motor truck industry.

Published the first of each month by

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WALTER WARDROP, *President and General Manager*
STANLEY A. PHILLIPS, *Vice-President and Editor*

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Ca'canny in Truck Production

HOWEVER mistaken labor may be in its occasional advocacy of ca'canny as a method calculated to advance the interests of the workers, capitalists who have adopted it as a principle of business are on much safer ground, since anything that offers a check to the growing tendency toward overdevelopment of manufacturing facilities deserves serious consideration as a means of preventing the waste of time and money incident to duplicated and, therefore, fruitless effort. Although the danger and cost of overexpansion are not likely soon to be forgotten by those who endured the agony and paid the price it breeds, there is a possibility that the appearances of prosperity may have their usual effect on men normally optimistic and awaken audacity to the point of recklessness while inspiring hope to the point of giddiness. And there is the certainty, too, that those who have not shared in the punishment inflicted by the evils of inflation will be even more easily misled into assuming the risks and burdens of truck manufacture in a field already overtooled.

It is the common thing for industry of all kinds to seek protection from foreign competition through the tariff, yet it rarely or never attempts to protect itself from the ravages of the ruinous domestic competition born to overexpansion. The kind of competition that is bred in the alleyways of commerce is far more menacing to the general welfare of industry than the kind that seeks a foreign market on the basis of quality or price. Industry, given the power, would place every kind of obstacle in the path of foreign rivals, but it raises not even a whisper against the haphazard development of business pirates at home. Yet the latter, in good times as well as in bad, have infinitely more capacity for industrial mischief than all the tradesmen from abroad.

There is talk of closed factories (due to a slackening demand and not to a lack of coal, say some) and there is ample evidence of inactive dealers (due to an insufficiency of business for all), yet the voice of the "boomer" echoes from the walls of every factory. Instead of a business that keeps a relatively even pace throughout the year, supplying, on the basis of capacity or near-capacity production in a few plants, a demand that arises from the rather uniform transportation needs of commerce, we observe feverish activity at certain periods and depressing languor at others—a physical condition that, were it in his body, no sane man would allow to continue unchecked. Instead of having controlled production, suited to the genuine needs of business and nicely adjusted to the best interests of the truck industry, there is a periodic oscillation between points of high and low production, regular undulations between active selling and stagnation, between employment and unemployment.

Perhaps it is asking too much to expect a manufacturer to keep production low in the face of a quickened demand, or even to refuse to let production run far ahead of sales, yet either policy exhibits better business judgment than the present method of attempting to make demand fit production. Sales should always be the guide to output but, like all guides, they should precede production, not follow it. To produce actively in anticipation of a large future demand, which is expected to come because of a similarly large demand in the past, can not, in any sense, be said to control production—it is to speculate in production. To produce steadily at a rate approaching that fixed by present demand is, however, to regulate production, to create a makers' market, and to check the enthusiastic ambitions of would-be newcomers in the field. Besides stabilizing the maker's business by converting probabilities into relative certainties, controlled production would do much to eliminate the evils of present overexpansion and to restrict the reckless inflation that is the natural development of the present system.

Is It "One or the Other"?

SANE heads in both camps—the street-railway and the motor 'bus—counsel compromise when discussing questions of competition between the two forms of passenger transport, the attitude of each being based on a theory of mutual accommodation that shall eliminate all hope of annihilation. The advice is well suited to temper the ambitions of those on either side who may aspire to come out victorious, although we doubt if the adjustment of what are necessarily conflicting interests will be so easily and peacefully brought about. Judging by the activities and expressions of those who direct and control the now prevalent form of urban transportation, the adjustment is not to be accomplished without a fight, the contention being that, until the railways are ready to embrace motor transport on their own account, no one else shall be allowed to do so.

The official organ of the American Electric Railway Association may be considered a faithful mirror of the opinions held by the organization's members, hence its editorial remarks on the subject of motor competition merit attention. "Where automobiles are competing with electric railways," it says, "one or the other is going to be put out of business, for street transportation at the minimum cost is a natural monopoly, and two competitors can not survive. It must be under single ownership or control. Whenever there are large numbers of people to be conveyed within limited periods, the electric car, with steel wheels running over steel rails, is the cheapest and most satisfactory form of transportation." There is in this to be sure nothing that one can really quarrel with; all can be easily and safely admitted. The only important error lies in one

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of the premises, and that is the supposition that the public does now and will always demand the cheapest form of transportation, an assumption that is not warranted by the history of most successful motor 'bus developments. The support given well-conducted motor 'bus lines demonstrates conclusively that the public is interested in many things besides the cost of transportation—speed, comfort, convenience are factors that a large portion of the populace is willing to purchase at a higher price. Nor is the public very much interested in the question of ownership as related to monopoly; it is more than likely that the public will favor any form of efficient transport that provides stimulating competition for the existing facilities. It is very doubtful whether, as the quoted writer says, "it is obviously in the interest of every community to keep its transportation services under one control and ownership," although one may safely agree with him when he states that "it is . . . obviously in the interest of the transportation company that it should provide all street transportation."

A compromise between the two conflicting interests will certainly be effected, but its terms, we suspect, will not be dictated by either of the interested parties. The traveling public has a very important voice in the matter and, from what has already transpired where the two forms of conveyance have been available, it may be said that the public shows a very decided preference for the motor service. The car-riding public will patronize each form to the extent dictated by individual convenience and necessity, and whichever form of carriage meets these tests in greater measure will be the prevalent type. The public will not discard either until something of greater comfort or convenience is devised.

Truck Owners for Uniform Practices

With the idea of bringing about uniformity of practice in the team and truck field, the following suggestions were recommended by a committee appointed at the convention of the National Team & Motor Truck Owners' Association:

1. We believe in standardization and uniform methods.

2. We believe in the burden of responsibility we assume in carrying through the service we render and will do our part in each instance, both moral and legal.

3. We believe in legislation that is equitable to all with uniform laws covering all states in the Union.

4. We believe there are problems of our business that are National in scope and come under the province of our National organization. Also that many sections of the country have local problems that can be handled by our Local Associations and they, collectively, can support our National movements.

5. We believe in coöperating with the railroads, boat companies and efficient highway transport companies to give the public the most efficient and economical transportation service.

6. We believe in street and highway improvement.

7. We believe highway transportation, within its scope, is an efficient rapid and economical means of distribution.

New Bethlehem Contract

In line with the policy of unusual cooperation with distributors and dealers the Bethlehem Motors Corporation of New York, manufacturers of the Bethlehem truck, has developed a contract with dealers which will embody the best features of usual truck contracts, but will be on a perpetual basis, automatically renewable year after year, so that Bethlehem dealer connections will be permanent connections of the new corporation.

The new contract provides for a stipulated number of deliveries during the first year—the number of trucks specified being on a conservative basis, in many instances only half the quantity the distributors and dealers estimate their territory will absorb. If the quota in the first year is taken, the contract continues for the second year, with an increase of 25 per cent in delivery specifications for the second year period, and a similar increase each year therafter. A uniform policy is adhered to, and a sliding scale of discounts is used, the chassis and parts depending on the size of the territory and the number of deliveries to be taken during the first year.

Under the new form of dealer relationship, there will be no renewing of contracts at stated intervals, but instead, changes that may be advisable from time to time will be made in the form of appendices to the contract proper.

Makers Protest Discrimination

Motor truck companies manufacturing specialized unit vehicles are planning to investigate the reasons for discrimination by the city of New York against trucks in which specialized units are used. Decision to take this step follows the action of the city street cleaning departments in advertising for bids on trucks in which it is specified the engines must be built by the same company manufacturing the truck. By this stipulation the field of bidders has been limited to half a dozen companies.

It is planned to point out to the city that many of the specialized unit manufacturers have been long in the field, that trucks of this type are employed in many cities of the country with success and that the best interests of New York City or any community are not served by the limitation of its purchases to a certain restricted class. Furthermore, it will be asserted that this discrimination is unfair to the representatives of the companies doing business and maintaining properties in the city.

Pneumatics on Paris 'Bus

Giant pneumatic tires are being used for the first time on one of the omnibuses operating in the City of Paris, says an exchange. The 'bus is a normal type single decker carrying 35 passengers which has been converted from steel wheels with solid rubber tires to Michelin steel disc wheels with pneumatics. Single tires are used in front and dual wheels and tires on the rear. The size is the same front and rear, being 1,085 by 185 mm., this being equivalent to 7.3 inches section. This is the biggest size pneumatic tire in commercial use in France.

The experiments on the Paris omnibus have been undertaken in order to get comparative data on costs. With solids the average life of a tire is 41,000 miles, and the tire cost per vehicle is 10 centimes per kilometer. In order to have any chance of being adopted by the Paris Omnibus company, it will be necessary for the pneumatics to show the same economy as solids.

O'Mara Promoted by White

Martin A. O'Mara, for the past two years manager of the Kansas City branch of the White Company, has been made a vice-president of the company and a member of the sales committee with headquarters at the general offices in Cleveland. Mr. O'Mara has earned steady promotion in the White organization. He entered the employ of the company about six years ago as a salesman in the St. Louis office, going to Kansas City as a salesman in 1917 where his efficient work led to his promotion to managership of the Kansas City territory in the early part of 1920.

As a member of the sales committee at the general offices Mr. O'Mara will have supervision of White truck sales in the territory covered by the following branches: Kansas City, Tulsa, St. Louis, Memphis, New Orleans, Dallas, El Paso and Houston. His successor as manager of the Kansas City branch has not been announced.

Team Owners Elect Officers

The National Team & Motor Truck Owners' Association at its Cedar Point convention re-elected the following officers: President, J. X. Galvin, Chicago; first vice-president, E. Foster Moreton, Detroit; second vice-president, Joseph W. Glenn, Buffalo; acting secretary, F. L. Henk, Detroit; treasurer, M. J. McDevitt, Cincinnati.

The following directors were elected to the board and will serve two years:

Gerald Garvey in place of Joseph K. Orr; Joseph Cavenaugh to succeed himself; F. B. Giles to succeed himself; Frank S. Gottry in place of John F. Weis; Wm. T. Grund to succeed himself; Paul J. Herbert to succeed himself; Thomas O'Brien to succeed himself; D. T. Hobbs in place of E. Strellan; Harry Masten to fill the unexpired term of the late Mortimer C. Green. (If the term has expired, he is to serve a full term.)

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Eight-Wheeled Truck and 'Bus Chassis in Production

CONSIDERABLE FUEL SAVING CLAIMED

The National Axle Corporation of San Jose, California, is beginning the manufacture of the 8-wheeled motor 'bus, street-car and truck for California, Oregon and Washington, under contract with the Eight Wheel Motor Vehicle Company, of 350 Post Street, San Francisco. The 'bus is designed to carry 24 passengers in inter-urban stage service. The street-car for 31 passengers has full headroom, crossseats on each side of a center aisle, arranged for "pay-as-you-enter," and one man control. The truck is of 4-ton capacity for fast transportation.

The advantages of the 8-wheel principle have been proved by actual operation of a full-sized 'bus, which was built a year ago, and has been driven over California highways and mountain roads for over 13,000 miles. The first 2,500 miles of road testing developed what few minor changes were needed in design and construction. The completed stage was operated under regular working conditions in all kinds of weather with full satisfaction.

The chassis are built with four front steering wheels and four rear driving wheels, designed so as to give extreme flexibility in both the front and rear sets of wheels. The load is thus distributed over eight wheels, each wheel carrying half as much load as would be the case if there were only the usual four. Indeed this difference is even greater, from the fact that special attention was given to designing the eight-wheel trucks so that the center of gravity of the load is much farther forward than on the ordinary four-wheeler. In the latter the two rear wheels usually carry about 85 per cent. of the total load, while in the 8-wheel truck the four rear wheels carry only about 55 per cent., and the four front wheels about 45 per cent. of the load. Therefore, wheels and tires may be comparatively small, effecting economy and safety of operation. The center of gravity of the car being correspondingly low, these vehicles are not likely to slide off the road, or overturn on sharp curves taken at continuous speed.

The two front axles are connected by springs on either side, so arranged that the axles oscillate about a central trunnion bar. If one tire blows out—indeed if a whole wheel comes off—the loss is so taken up by the interrelation of the four wheels of the front set, that the steering ability is not materially affected. Since the load is so distributed, normal tire pressures are sufficient for the 8-wheel vehicle, giving great resilience, as well as security against skidding and blowing out.

The flexibility of the 8-wheel construction is such that when the wheels on one axle roll over a bump, the body is raised only half as high as would be the case with the ordinary 4-wheel chassis. Considering the 8-wheel vehicle, suppose the leading wheel of the front set goes into a hole in the road four inches deep. Its axle drops four inches. The following wheel of the front set still remains on the level, so its axle does not drop at all. Therefore, the trunnion, midway between the two axles, drops but two inches. Yet the time it takes the leading axle to drop four inches is the same as that taken by the trunnion in dropping two inches. Therefore, the velocity of drop of the axle of the leading wheel is twice as great as the velocity of drop of the trunnion. Now, the force of impact is directly proportional to the energy of motion, which in turn is directly proportional to the square of the velocity, according to the formula $E = \frac{1}{2} m v^2$. Therefore, since the velocity of drop of the axle is twice as great as that of the trunnion, the energy of its motion would be as the square of 4 is to the square of 2, or as 16 is to 4. In other words, the bump or jolt upon the body of the 8-wheel car is only one-quarter as great as is the case with a 4-wheeler, or the 8-wheel principle makes for four times as great riding ease than is possible with the 4-wheel principle, say the makers. The collective supporting effect of all eight wheels is on the center line of the chassis, instead of at the corners of the frame.

Since there are four rear driving wheels on the ground, the tractive effort is double that of the usual two-wheel drive. Also, by the interconstruction of the driving axles, each wheel holds the road well. This eliminates skidding and slippage. When an ordinary chassis runs over a bump, or jumps a rut, one or both rear wheels will be slightly off the road, and tend to run ahead or behind the rest of the car, according to whether the motor is pulling, or the brakes holding back. Upon return to the road a slight skidding or slipping occurs, which not only jars the passengers uncomfortably, but causes extra wear on the tires. Through the prevention of this slippage and other economies a saving of 15 to 25 per cent. in gasolene consumption is said to be made possible.

Heretofore it has been the practice to have the two front wheels of all automobiles 'toe in," in order to offset the drag due to the plane of revolution of the wheel being outside the pivotal point of the steering knuckle. Neither of the front wheels runs parallel to the direction of motion of the car, so there is a sliding effect on the tires, causing wear. This feature has been eliminated in the 8-wheel construction, by making the tires revolve about a point directly under the steering pivot. Therefore, the wheels run straight, and the wear on the front tires is avoided, according to the makers.

There is a separate brake upon each of the eight wheels. Furthermore, the brakes are operated by compressed air, in the same manner as those on a railroad train. Thus, the driver is enabled to stop a full loaded 'bus quickly, and without physical exertion, no matter what the condition of the road. Also, since the brake area is so great, the effect required of each brake lining is correspondingly less.

Another innovation in the 8-wheel vehicle is a transmission providing 8 speeds forward and 2 reverse. In every speed the transmission is practically noiseless and free

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Dealer Explains Effect of Quality on Truck Economy

FIRST COST RELATIVELY UNIMPORTANT

Operation of trucks costs their owners many dollars each day. In the course of each year a sum equal to a good part of the first cost must be expended for upkeep and operation. This money is well spent if, in return, each truck produces low-cost transportation, measured by miles traveled or tons carried. Many owners know what their trucks produce in work; and the exact cost; some guess; some don't know.

To provide a standard which will enable truck owners to analyze their costs and concentrate their attention on the larger items, the Harrolds Motor Car Company, Pierce-Arrow dealers in New York, has examined the records of operation of 5-ton Pierce-Arrows in many lines of business in New York City.

The results shown here should be of value to all truck owners. The tables give a logical arrangement of costs. The conclusion is based on sound principles.

"Compare the percentages given here with what you are spending, looking especially for the big items," says the company's statement. "Watch the big costs for big savings.

"Eleven items enter into operating costs. The records noted before show that each dollar spent is divided as follows:

Driver's wages	26 cents
Gasolene	20 cents
Depreciation	12 cents
Repairs	12 cents
Tires	10 cents
Garage rent	7 cents
Liability, property damage, and collision insurance	5 cents
Interest on investment	4 cents
Oil	2 cents
Fire and theft insurance	1 cent
License	1 cent

"Thirty-nine cents must be spent for fixed items. No matter what price truck you buy, or how well it serves you, these costs are practically the same.

Driver's wages	26 cents
Garage rent	7 cents
Liability, property damage, and collision insurance	5 cents
License	1 cent

"As these are fixed items, your chances for economy must be sought elsewhere.

"Forty-four cents of every dollar spent for truck operation is in the hands of your driver.

Gasolene	20 cents
Repairs	12 cents
Tires	10 cents
Oil	2 cents

"Your driver will bring out the best there is in your truck. But he can produce a high gasolene and oil mileage only if the truck has power to pull its load without frequently running in low gear. He can save tires and springs from jolts only if he knows he has power to pull steadily out of ruts and pits, and pick up speed again. He can give you a full day's work only when the truck runs continually without stops on the roadside for repairs.

"Forty-six cents of the average dollar spent for truck operation depends upon the

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Kissel Develops a Novel 18-Passenger Motor Coach

35-MILE-AN-HOUR SPEED IN COMFORT

What promises to establish a new standard of riding comfort in 'bus transportation is the new Kissel "Coach Limited" just announced by the Kissel Motor Car Company, Hartford, Wisconsin. An inspection reveals the fact that Kissel has got away from the customary 'bus design and produced a vehicle that in body fashion and finish, appointments and equipment, mechanical innovations and engineering features provides the riding ease, operating smoothness and quietness of the sedan.

Kissel has gone further, even ignoring the common practice of employing a heavy chassis and motor of truck line proportions. Kissel employs a specially designed chassis that is practically the same as that of its passenger car chassis with, of course, those necessary additions to take care of increased wheel base and the weight of a body of 18-passenger capacity, designed and built on coach sedan lines.

The coach body is custom built throughout and is produced in the Kissel shops by the same body designers and builders who produce the entire line of Kissel automobile bodies. It is hand made throughout, with all sills, frames and body pillar connections especially designed, constructed and braced with angle irons that permit no body spreading or squeaking. All lumber is specially prepared northern ash covered with 14-guage aluminum. Entrance is made on the right hand side through four doors, each door opening directly into a seat of full sedan width and depth, with plenty of leg room for passengers' comfort. The seats and backs are specially shaped and built to conform to the most comfortable sitting and riding position and are upholstered in Spanish leather. The seat backs are 24 inches high and are equipped with slumber rolls for added comfort.

All four doors are automatically locked when closed and can be opened only after the driver releases the catches by operating a lever. This device makes it impossible for a passenger to open the door when the coach is moving.

Perfect ventilation without drafts is attained by four roof ventilators installed in the roof, two in front and two in the rear, easy to open and close. Also ten large windows can be lowered, in addition to the windshield. The lighting system comprises eight dome lights in the celing, flooding the interior with an indirect light.

For cold weather travel proper temperature is assured from four Perfection heaters so located that it is absolutely impossible for the interior to be heated in spots, the construction of the body providing for the maintenance of an even temperature.

The special 'bus frame is 43 inches wide with 8-inch side rails of ¼-inch gage and equipped with five cross-bars. To assure maximum spring flexibility semi-elliptic alloy steel springs are used in front, 38x2½ inches in size and 60x2½ inches in the rear. Both springs are equipped with side-play adjustments that eliminate rattles or squeaks. Specially designed front and rear axles are used, while the brakes possess special braking surface.

A 61-horsepower Kissel motor supplies the power for a speed of 35 miles per hour. The oil supply is automatically regulated by the speed of the motor while the cooling system has a thermostatic control that maintains an even temperature in winter and summer.

The complete specifications follow:

Engine—Six cylinders 3-5/16 by 5½ developing 61 h.-p. at 2,300 r.p.m.

Clutch—Multiple-disk dry plate.

Universals—1 double from transmission to self-aligning center bearing; 1 double from center bearing to rear axle.

Transmission—Selective sliding gear type—ball-bearings on main shaft, Hyatt bearings on counter-shaft; 3 speeds forward, 1 reverse.

Reductions—On low, 3.66:1; on second, 1.81:1; on direct, 1:1; on reverse, 4.58:1.

Rear Axle Reduction—6.33:1.

Total Reduction: Engine to Rear Axle—On low, 23.16:1; on second, 11.45:1; on direct, 6.33:1; on reverse, 28.99:1.

Road Speed—35 miles per hour.

Steering-Gear—Ross screw-and-nut type, 18-inch hand wheel

Final Drive—Double reduction.

Frame—8-inch side rails, ¼-inch gage, 0.22 carbon steel, 5 cross-bars, frame 43 inches wide.

Springs—Front: 38x2½-inch semi-elliptic; Rear: 60x2½-inch semi-elliptic.

Front Axles—I-beam, drop forging, alloy steel spindles, taper roller-bearings, spring centers 30 inches, track at ground 64 inches.

Rear Axles—Double reduction, cast-steel housing, alloy steel shafts, track 66 inches at ground, spring centers 48 inches.

Brakes—On rear wheels, internal expanding; foot brake 17x2½-inch Thermoid-lined, emergency brake 12x2½-inch Thermoid-lined.

Wheels—Aluminum.

Tires—32x6 pneumatic all around.

Fuel Tank—30 gallons in rear, emergency tank, 9 gallons, under second seat.

Wheel-base—202 inches.

Height of Chassis from Ground, Loaded—22½ inches.

Weight of Chassis with Gasolene, Oil and Water—5,120 pounds.

Weight Without Gasolene, oil and Water—4,850 pounds.

Weight of 'Bus Complete—7,780 pounds without passengers.

Body specifications follow :

Seating Capacity—18, including driver.

Luggage Carriage—A 3-ply veneer top gives one-half ton luggage capacity on top of roof with specially designed and fastened luggage rails.

Length of Body—194½ inches.

Width of Body—76 inches at widest point.

Height of Body—57 inches at highest point.

Top of Body to Ground—79¼ inches.

Bottom of Body to Ground—22¼ inches.

Door Control—Special locking device, operated by hand lever from driver's seat, automatically locks or releases all doors.

Ventilation System—Four special roof ventilators, two in front and two in rear, easy to open or close. Also all windows open and close easily and quickly.

Lighting System—Eight special dome lights in ceiling turned on or off in pairs.

Heating System—Four Perfection heaters properly located and connected direct to the exhaust.

Coach Work—Body designed and built on same lines as the Kissel sedan, hand-made throughout with all sill frames and body pillar connections specially braced with angle irons. Lumber northern ash covered with 14-gage aluminum.

Doors—Four on the right hand side, each triple-offset into a triple-offset pillar post and equipped with anti-rattlers and bumpers and hung on four heavy hinges.

Seats—Full coach design in depth and width, permitting plenty of leg room for passengers. The backs are 24 inches high from the seats and are equipped with slumber rolls.

Upholstery—Seats and backs, side walls and ceiling are upholstered in Spanish leather.

Windows—Extra wide and equipped with ¼-inch crystal glass.

Riding Qualities—The frame is of Kissel design, with kick-up over front and rear axles, insuring low body design and the utmost riding comfort for passengers at all speeds; no side swaying or skidding around corners.

Post-Office Prepared for Railway Strike Emergency

WILL USE TRUCKS ON NATIONAL SCALE

In addition to telling how the motor truck had enabled the Post-office Department to extend the services, especially in the rural sections of the country, Harry H. Billany, fourth assistant postmaster general, in an address before the Rotary Club in Wilmington recently, gave some interesting information regarding motor equipment, economies, etc.

"The United States mail trucks which you see on the streets every day," he explained, "are part of the motor vehicle service of the Post-office Department. In this division (motor vehicle) we are operating in 344 cities, with 4,115 trucks and 4,067 employes. For these trucks we buy annually 42,000 tires, 8,000,000 gallons of gasolene and 244,000 gallons of cylinder oil. The appropriation of $15,000,000 for this service was the same in the year 1921 as in 1922, yet we closed the fiscal year, June 30, 1922, with a surplus of $400,000, notwithstanding that we had an increase in the service in 78 cities.

"This saving was accomplished in several ways. The system of allowing each postmaster to purchase his supplies locally has been discontinued. All supplies are now purchased through the Supply Division. We have now standardized on 8 makes of trucks, whereas formerly there were 32 different makes and types. Central repair units have been establishd, thereby very materially reducing the cost of repairs. While the painting of the trucks seem to be a small item, we are saving annually $75,000 by changing the color from red, white and blue to olive drab."

Would Bankrupt Kentucky Wagon

An intervening petition in a bankruptcy suit against the Kentucky Wagon Manufacturing Company, of Louisville, Kentucky, has been filed by W. T. Godfrey, attorney for the Kentucky Title Savings Bank & Trust Company. Other creditors recently stated they were willing to drop the bankruptcy suit and accept terms of a merger into the $80,000,000 Associated Motors Industries, of which the wagon plant is a part.

Mr. Godfrey said that the petition means that the company will be thrown into bankruptcy and the merger prevented unless the bank's claim for $45,000 is met. The bank refused to agree to the merger, which, Mr. Godfrey said, would have meant the acceptance of second mortgage bonds.

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The Truck's Place in Railroading

By ELISHA LEE

Vice-President, Pennsylvania Railroad Company

FEW present day developments in transportation surpass in importance the rapidly growing use of motor vehicles as common carriers, particularly in the freight service. Public discussion of the subject, however, often goes astray in dealing with the motor truck exclusively as a rival or competitor of the railroads. The influence seems to be that it can live only on profits taken away from the rail lines, and that its future importance to the country must be judged from that aspect.

Personally, I do not subscribe to these views. The importance and value of commercial motor transport to the country as a whole will not lie in menacing or injuring the railroads, but in the extent to which it is capable of aiding them to greater usefulness by assisting in the improvement of their indispensable public service and in the solution of their problems of operation and earnings.

The railroads are evolving into wholesale transportation machines. They are becoming more and more adapted to the handling of goods and commodities in bulk—to the movement of full car loads and long trains. This development is a natural response to the needs of a country having such enormous quantities of freight to transport over such vast distances. The railroads still do a great deal of purely retail business. Some of it perhaps pays its way, but much of it unquestionably entails a loss, either directly or by reason of the bulk traffic which it crowds out.

This is particularly true of less-than-car load freight. In the immediate vicinity of all our highly developed industrial and commercial communities, an immense amount of such traffic originates. A large portion of it moves only a few miles, but in its handling we are obliged to employ the most costly and overworked facilities which the railroads own, viz., their yards and terminals in the great centers of industry and population. As every one knows, the increasing expense of constructing, maintaining and operating such terminal facilities has become one of the greatest problems of railroad financing, while nearly every period of railroad congestion has had its principal cause in terminal overcrowding.

Here is a real opportunity for the motor truck to demonstrate its utility upon a true economic basis. The reason why less-than-car-load traffic, especially on the shorter hauls, is becoming a growing burden upon the railroads is that we are obliged to use it in terminal facilities and rolling stock which are too expensive for the purpose, and which of necessity must be primarily planned and adapted to the handling of bulk traffic, mostly moving over the longer hauls.

Therefore, I believe it to be at least probable that in many instances the short haul less-than-car-load freight traffic could be turned over bodily to motor trucks with resulting advantage to the railroads and their patrons, and with reasonable profits to the truck owners. That outcome, if realized, would assuredly be beneficial to the country in general.

It is possible to imagine an extension of the same ideas by which long-distance, as well as short distance, less-than-car-load freight can also be handled, with increased efficiency over present methods, through a plan of combined truck and railroad service. This would involve detachable bodies on freight carrying trucks. The bodies would be so constructed as to be used as containers for less-than-car-load freight, and when loaded would be placed upon suitably equipped railroad cars for the intermediate journey between the rail terminals; the service at each end, to and from the rail terminals, including "store-door" collection and delivery, being performed by the trucks.

Service of this character is emerging from the purely theoretical stage, and many competent authorities believe that it has a great and promising future. Its advantage lies in using both the trucks and the railroads for the portions of the through service which they are best fitted to perform. The railroads can do the long-distance hauling between terminals better than the trucks, and the trucks can do the work between shipper, or consignee, and terminal better than the railroads.

I wish to add a word of caution. It is not just or reasonable to permit motor trucks to take the cream of the less-than-car-load freight and leave the skimmed milk for the railroads. If the trucks are to handle that traffic at all, in a given area, they should take it in its entirety so that the railroads may discontinue altogether their organizations and arrangements for taking care of that form of freight service, when it can be done by trucks more advantageously and more satisfactorily to the public. This entire matter is now being studied by railroad managements. The outlook is promising, but there are some practical difficulties which must be overcome before acceptable results can be hoped for from putting the plan into actual operation on any general scale.

There is one point on which my own mind is clear. The shipment of freight from one station to another, within the same terminal area or city, is a form of service from which the railroads should, as nearly as may be possible, be entirely relieved. All intra-city freight should be trucked, save that small portion which, by reason of excessive weight or bulk, requires railroad equipment and roadbeds for its proper transportation.

Similarly the interchange of less-than-car-load through freight between the terminals of various railroads coming into a given city constitutes another field in which motor trucks may prove valuable helpers of the rail lines as less costly substitutes for interline switching. In this case the proper development calls for the use of a large number of detachable bodies in connection with a relatively small number of chassis to perform the interchange service. The plan is being tried with some success in several middle western cities and may later be found capable of further extension.

The use of motor trucks as feeders to railroad systems in such manner as to perform practically the function of branch lines is still in its infancy. Its possibilities deserve and, doubtless, will receive increasing attention in the future. Few railroad branch lines of the present time are profitable; many—probably the majority—are operated at heavy losses. There is little incentive to establish new ones, or inducements to supply the funds required for such purposes. Here is another chance for the motor truck to test out its worth.

GRANTING an adequate basis of taxation to compensate for the otherwise free use of highways constructed and maintained by the public, it is not my belief that motor trucks are destined ever to rival the railroads in the field of car-load or bulk transportation, especially over the longer hauls. Highways capable of sustaining a heavy motor-truck service cost more to build and keep in repair than do standard railroad lines, and the latter can, when dealing with the larger quantities, carry each ton a mile for a far lower cost. Moreover, the superiority of railroads in contending with severe weather conditions and in being ready to handle any and all kinds of traffic when offered is obvious, and, in my opinion, not likely to be impaired.

The advantages of trucks lie in the flexibility of their operation and in the fact that they do not require elaborate and expensive terminal facilities. They seem especially adapted for handling less-than-car-load traffic over short distances and on good roads and well paved streets, and for performing the terminal portions of the service required in the collection or delivery or through or long-distance less-than-car-load rail traffic. In the one instance they are capable of giving service to points not reached by the railroads and of helping to relieve the railroads of a burden; in the other instance they directly act as auxiliaries to the railroads in performing their service to the public. In both cases they should prove useful aids in increasing and extending the utility of our existing railroad system.

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Motors Will Save Situation If Rail Strike Comes

By CHARLES CLIFTON

President, National Automobile Chamber of Commerce

PROTECTION for the public is assured by the motor car and truck if the railroad strike becomes serious. Several of the larger cities have already prepared emergency organizations to handle the transport situation. The National Automobile Chamber of Commerce has listed 935 motor truck lines which could be of material aid in a transportation crisis.

The country could not dispense, even for a short time, with a major avenue of transportation such as the railroads without suffering. Study reveals the fact, however, that there are enough motor cars to handle the passenger traffic, if necessary, for an indefinite period, and that there are sufficient motor trucks to prevent acute shortage in essential supplies for 60 days. It would be possible, in fact, to maintain our large cities on a ration basis for an indefinite period.

Great Britain found that motor transportation was a life preserver in the rail crisis of 1919. The British Road Transport Board divided the country into 12 transport areas, each in charge of a local commissioner. The public parks in London were converted into motor transport depots. Two hundred and fifty volunteer drivers were secured. First attention was given to the milk supply. The quantity of milk going to Liverpool by motor truck on September 30 was reported to be greater than the amount ever brought in in any one day by the railroads. The mails were kept moving by motor car and motor truck. Drivers of private automobiles were given postal licenses so that the motorists might assist in the delivery of mail sacks.

The United States, to be sure, is a vastly larger area than Great Britain. On the other hand, this country has ten and a half million motor vehicles compared with the half million in the British Isles.

Another ray of light in the situation is the improvement of our highway system. Over 12,000 miles of surfaced roads were built last year, and a larger record is being made this season. What is accomplished is but a fraction of the 180,000 miles of highways which the states and nation are planning to construct within the next fifteen or twenty years. Nevertheless, the roads are in better condition than they have ever been before, which means lower transportation costs and greater efficiency.

The rail crisis, in fact, points out clearly the great importance of a well-developed system of highways, assuring the public of transportation at all times. The highways not only serve as economic benefits day by day, but they also constitute an insurance against isolation in the event of a railroad tie-up.

The movement of passengers, no matter how severe the strike, need not be seriously impeded. There is one car for every 6 or 8 adults in the suburban districts of our cities. Hence this element of passenger travel can be readily cared for. The motor car can also be used efficiently for all short business trips, and is also practical, though less convenient, for long-distance traveling. The vacation travelers need not worry over the situation as motoring is an increasingly popular form of recreation. Over a million persons, for instance, go motor camping every year.

Surveys completed within the past few weeks in New York showed that a sufficient quantity of milk for the necessary uses in the household and for invalids and children could be brought in by motor trucks from distances of 150 to 200 miles. The daily consumption of milk amounts to 2,670,000 quarts. Other foodstuffs consumed daily in New York are: 5,145,804 eggs, 219,527 pounds potatoes, 434,000 pounds butter and 3,482,322 pounds of fresh and provisioned meat. The Port Authority of New York believes that the staple vegetables such as potatoes, onions, cabbage and carrots could also be supplied by trucks from nearby sections.

Reports from Cincinnati indicate that the milk supply will not be materially affected by the strike. Cincinnati consumes daily approximately 190,714 quarts of milk, of which less than 3 per cent. is brought into the city by railroads under even normal conditions.

The 3,800 farmers shipping milk into Cleveland, which daily consumes about 381,428 quarts, are using trucks altogether. Milk coming into Philadelphia by trucks now amounts to 64,169 quarts daily.

It is estimated that the trucks operating out of Louisville, Kentucky, will soon be handling 500 tons of supplies both on the out-bound and in-bound trips. Under normal conditions the trucks and interrubans handle 75 per cent. of all perishable foodstuffs in Kentucky and southern Indiana. Louisville daily consumes 116,086 quarts of milk, 224,121 eggs, 151,405 pounds of fresh and provisioned meat, 18,869 pounds of butter and 9,544 pounds of potatoes.

Daily scheduled motor truck service to all industrial centers within 75 miles of Indianapolis will be maintained. Five completely equipped transport terminals have been established. Consignees' door delivery on all express and first and second and third class freight shipments will be made. Pick-up of all freight consignments at shippers' platforms will be made if such service is ordered the day prior to the date of shipment. Special service on express and all classes of freight will be maintained between Indianapolis, Chicago, Detroit, Cleveland, Columbus, Cincinnati and Louisville.

The meat-packing industry will not be materially affected as 2,500 head of hogs are hauled daily by trucks into the St. Joseph, Missouri, stockyards. Fifteen motor express lines for handling livestock shipments within a radius of 45 miles of Kansas City have been established. Another Kansas City motor line is planning to extend its radius of haul to a maximum of 65 miles.

Farmers are using trucks extensively to bring their products to the consumer markets direct. The Bureau of Crop Estimates of the United States Department of Agriculture has discovered that the motor-drawn vehicle travels 25 per cent. longer distance, makes 183 per cent. more round trips, carries 48 per cent. more corn, 50 per cent. more wheat and 83 per cent. more cotton than horse-drawn vehicles.

Eight-Wheeled Truck

(*Continued from page* 11.)

from vibration. Passenger-carrying service requires frequent stops, so that the only way to maintain a fast schedule, without traveling at too high a speed, is by quick acceleration in starting. Also, it is desirable to operate the engine at its most economical speed.

Safety for passengers is accomplished by the low center of gravity, and constant traction, which insure against skidding and overturning; by the eight small tires and wheels, enabling sure control of the car in spite of blow-outs or loss of wheel; by the eight air-brakes, for quick stopping in emergency; and by the provisions for comfortable and easy operation, leaving the driver untroubled to watch the road with the vigilance essential to safety.

Comfortable riding is provided by the reduction of bumps and shocks; by the elimination of transmission noise and vibration, whether running in low or high gears; by the resilience from moderate tire pressures; and by the cushioning of all working parts.

Economy of operation is attained by use of small wheels, and stock car tires; by enlarging the brake area, with consequent saving of brake linings; by prevention of excessive wear of tires, with elimination of slippage and skidding—particularly of rear wheels—and by making unnecessary the "toeing-in" of front wheels; by 15 to 20 per cent. saving of gasolene, due to positive traction, and to prevention of slippage, and racing of engine by elimination of torsion stresses, and consequent long life of frame and body; and by the eight ratio transmission, enabling maintenance of proper engine speed in all gears.

New Truck Maker

United Motor Products has been incorporated in Grand Rapids to build two truck models, one under 1 ton, the other from 1 to 2 tons.

The officers of the company are: F. T. Hulswit, president; Harry Green, vice president in charge of finances, and G. R. Wilbur, vice president and general manager. Mr. Hulswit is president of the United Light & Railway Company of Grand Rapids. Mr. Wilbur for the last eight years has been with the Republic and Ruggles companies. A. G. Boone, formerly chief engineer of the Ruggles company, will be in charge of manufacturing and engineering production.

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'Buses for Chicago "L" Lines

The Chicago Elevated Railways have announced plans for the operation of 'buses to supplement its electric railway service. This involves a recognition by the management of the elevated lines of the utility and convenience of the 'bus for passenger transportation, so capably demonstrated during the recent strike on the street and elevated railway lines, and indicates a determination to take advantage of the 'bus as a feeder for the electric lines.

Three 'bus lines are being considered for the inauguration of the service, and 14 'buses will be operated on these routes as a beginning. The routes begin at the end of three elevated lines and extend from one to two and a half miles through well-populated districts. The 'bus lines will be an integral part of the elevated service available to the passengers without extra fare. Transfers will be issued from 'buses to electric trains or from trains to 'buses.

It is estimated that probably 40 'buses will be required when the service is fully developed. The company expects to use 'buses seating about 25 passengers, lighted and heated by electricity. It is said that the company has decided on Whites. Formal application has been made to the Illinois Commerce Commission and to the city authorities for permission and license to operate the 'buses.

July Output Third Largest

Shipping reports to the National Automobile Chamber of Commerce, 90 per cent complete, indicate that July shipments from all factories will reach a total of 28,412 car loads, 28,022 driveaways and 6,855 boats. On this basis it is estimated that 246,600 passenger cars and trucks were produced by all makers in July, exceeding July, 1921, by 39 per cent, and the best previous July (in 1920) by 20 per cent. The decrease under June of 14 per cent is seasonal, and expected. This is a record for production in July and is the third largest single month's production in the history of the industry, being exceeded only by the two preceding months.

The factory shipping figures for all manufacturers are:

	Car-loads.		Driveaways.		Boat.	
	1922.	1921.	1922.	1921.	1922.	1921.
Jan.	15,357	6,485	7,479	3,185	143	93
Feb.	19,636	9,986	10,173	7,507	180	99
Mar.	27,753	16,287	16,917	9,939	560	75
April	31,334	20,187	22,381	14,197	2,960	1,619
May	33,416	18,608	28,827	15,193	7,406	2,381
June	34,230	20,269	33,857	18,834	7,737	3,947
July	*28,412	19,514	*28,022	15,533	*6,855	3,726

*July, 1922, partly estimated.

New Kelly Truck

A new model truck known as K-61 has been announced by the Kelly-Springfield Motor Truck Company of Springfield, Ohio. The specifications are as follows: 5-7 ton capacity, 4½x6½ motor, tires 36x 6 front, 36x7 dual rear. The price of this chassis is $4,800.

Chevrolet Prices Down

Prices on Chevrolet commercial chassis have been reduced. The model Superior chassis is now $425 and with light delivery body $510. The model G truck chassis, ¾-ton, priced at $745, is now $650, and the model T, 1-ton capacity, which was sold at $1,125, is now listed at $1,095.

'Bus Good for Developing Service, Street-Car for Holding It

By WALTER JACKSON

OUR well-known American impulsiveness is threatening a change in the opinion of many electric railway managers from "The motor-bus is N. G." to "The motor-bus means good-bye, trolley." By present developments one viewpoint is as unjustified as the other. I do not propose to go into figures to prove this, but will ask the timorous tramwayman to ponder some facts noted in England last summer.

The Liverpool Corporation Tramways has been operating motor 'buses ever since it bought out the Woolton Motor Omnibus Company in 1911. In 1913 it carried 295,023 passengers, but by 1920 this traffic had risen to 5,185,898 passengers compared with 215,033,193 street-car riders. These motor 'buses were of two classes, those tieing the outer terminals of tramways and those which ran between suburbs and the Pier Head, paralleling the street-railways within the inner areas. In one instance headways for part of the day were down to 7½ minutes, but the more characteristic headways were 15, 20 and 30 minutes.

If some eight years' experience had shown the Liverpool Corporation that motor 'buses are cheaper than street-railways for routes of dense traffic, we might have expected a much greater expansion than that indicated. As a matter of fact, the management is now reducing rather than increasing its motor 'bus services. Instead of operating 100 'buses or so as planned, the corporation had but 39 in service during 1920 and had offered to sell excess equipment due to the elimination of less remunerative lines. In 1920, the total motor 'bus receipts were $232,670 and the total expenses, including fixed charges and depreciation, $438,745. To be sure, an equivalent street-railway service installed at war prices might have proved worse, but in any case it can not be gainsaid that the corporation learned something about upkeep and other things in operating 665,247 'bus-miles during this year of 1920.

The matured policy of the Liverpool Corporation Tramways is to use the 'bus where it is out of the question to use the tramway, but not to use the 'bus to parallel its own street-car service. It is possible that some of these paralleling services would have done better if operated as expresses at special fares, but that is purely speculation.

On the other hand, observe that Liverpool is planning right-of-way strips for trolleys on outer parts of radial roads now under way. In some cases these roads are to be widened from 80 to 120 feet, while others are being widened to 136 feet. Let me quote J. A. Brodie, city engineer of Liverpool, as per his paper, "Street Transport in Cities," of December 5, 1921, before the North-Western Section of the Institute of Transport

"The idea underlying the Liverpool method is that, if a limited number of main arterial roads suitable for fast traffic to the outer areas are provided, many of the existing streets can be left without much widening for the present and will provide sufficiently fast services for districts within say 3 miles from the center of the town where the total time of travel does not exceed 30 minutes, and where the saving of even 10 minutes is not usually a matter of much importance.

"The fast services through the improved trunk roads on the other hand will probably afford a saving of time of approximately 50 per cent. for the longer journeys to the more distant suburbs, for which at present a journey of from 30 to 50 minutes is required."

Mr. Brodie then discusses the point whether motor 'bus or tram operation would be more desirable over these new highways. He notes that as all improvement in street paving tends in the direction of smoother surfaces, it is not likely that the usual motor 'bus can travel safely at such high average speeds as 20 miles per hour "unless it is provided with a track itself, and it is even then somewhat doubtful whether it could accelerate and particularly decelerate quickly, as well as safely, unless guided in some way by projections above the track surface which would protect it against the evils of side slipping and skidding at high speeds, under unfavorable conditions of weather and street surface.

"On the other hand, as regards tramways, we know that after trials in Liverpool on a separate track in Edge Lane Drive, the Board of Trade allowed 20 miles per hour on that route for ordinary service and, after seven years' continuous working, there is now no doubt that such speeds can be safely worked while the cheaper cost of construction of a track laid on sleepers in grass, amounting to 50 per cent., both in first costs and also subsequent maintenance, is likely to lead to its general adoption wherever additional width of road can still be provided at a reasonable cost.

"Whatever the final result may be where slow tramway speeds in narrow streets is adhered to, I am definitely of the opinion that, unless there is some very considerable advance in motor 'bus construction and carrying capacity beyond what is at present in sight, an improved and quickened tramway system, established on the most up-to-date footing both in the matter of track and vehicles, need not fear the competition of the motor 'bus nor indeed of any other known competitor in sight, including the electric train [i.e., electrified lines], for distances of from 3 to 8 miles outward from the center of our large cities, provided, of course, that the amount of traffic warrants the expenditure of capital necessary to construct and equip the lines."

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Alcohol-Benzol Mixture Is Used by All Paris 'Buses

FUEL CHEAPER, MAINTENANCE DEARER

The biggest practical experiment in the use of alcohol for internal-combustion engines is that now being carried out on the Paris 'buses. Since August 1 of last year the thousand-odd 'buses in service in the French capital have been run exclusively on a 50 per cent. mixture of alcohol and benzol, and the total amount of this fuel consumed by the Paris Omnibus Company since the experiment started is practically 5,000,000 gallons.

While in some quarters experts and commissions are studying this problem from a theoretical standpoint, the French are demonstrating that alcohol and benzol in equal proportions can be employed in normal engines with complete success. It can not be denied that the 'bus service is now as regular as at any period of its existence, and, except for a slight difference in the odor emitted from the vehicles, there is nothing to indicate to the public that the 'buses of Paris are not being run on the same kind of fuel as employed in London or elsewhere.

Special circumstances, however, have made possible the use of an alcohol-basis fuel and, but for these, it is doubtful if the experiment would have been made, much as the French are desirous of being made independent of foreign supplies of gasolene. By the terms of the Versailles treaty Germany had to supply large quantities of benzol, and this fuel is now being delivered to the French government. During the war the production of alcohol for making explosives grew to nearly 200,000 gallons a day, and after the armistice immense stocks were accumulated. In order to liquidate these stocks the French government decided to market what is termed its "national" fuel consisting of 50 per cent. German benzol and 50 per cent French alcohol.

Only a very half-hearted attempt was made to put the "national" fuel on the market, and even then it was only found in the immediate neighborhood of Paris. Obviously it was a much simpler matter to arrange with a big concern like the Omnibus company to take up the supplies of alcohol-benzol fuel than to try to convert individual users to its use. The price paid by the Omnibus company for this mixture is not known, but it is admitted by officials that the rates are such that there is a distinct advantage in using it in preference to gasolene.

When the "national" fuel was on the market its price per liter was slightly less than the price of gasolene, but the cost per mile was higher. Thus, .730 gasolene was sold retail at 1 franc per liter, which worked out at 22 centimes per thousand calories, while the alcohol-benzol mixture was marketed at 1 franc 65 centimes per liter, equivalent to 24½ centimes per thousand calories. For this reason the big taxicab concerns and the owners of truck fleets, which before the war used benzol almost exclusively, refused to adopt the government mixture. Incidentally, these firms are not altogether pleased with the present arrangement, which has withdrawn practically the whole of the benzol supplies from the market and placed them at the disposal of the omnibus company only. French production of benzol is very small at the present time, while importation from England and the United States is handicapped by reason of exchange rates.

In seeking information on the use of alcohol and benzol by the Paris Omnibus Company, it was rather curious to observe that there existed partisans and adversaries of the fuel among the technical staff. While certain engineers declared excellent results were being obtained, others hinted at innumerable difficulties.

It was ascertained that the increase in consumption was 35 per cent. in bulk. This is rather more than careful experiments have led one to expect, but an examination of the records showed daily fluctuations which can only be explained by inexperience in the use of the new fuel. The 'buses average just a shade under 9 miles to the gallon on the alcohol mixture. In order to understand this figure it should be explained that the Paris 'bus is a single-decker carrying 38 passengers, weighing empty 5 tons, and averaging 8 tons with full load. Two types of engines are in use, the more modern being what is known as the H engine with four cylinders of 105 by 150 m.m. bore and stroke, running at 1,000 revolutions, and the older type being the PB2 with four cylinders of 125 by 140 m.m. running at 900 revolutions. The compression of the newer engine is 4.55 kilometers, and of the older model 4.6 kilometers. Two makes of carbureter are used, the Solex and the Zenith.

These engines were not specially designed for alcohol, but were originally intended for running on gasolene or benzol or combinations of these two. From 1907 to 1914 benzol was the fuel generally employed; during the war the restricted 'bus service was assured on gasolene; during a part of 1912 and 1913 experiments were carried out with alcohol on a rather limited scale.

When it was decided, nearly a year ago, to adopt the alcohol-benzol mixture exclusively, the advisability of increasing the compression was considered. As the number of 'buses is 1,000, and will shortly be increased to 1,300, the necessary changes would occupy nearly two years if carried out in instalments in such a way as not to interfere with the normal service. There being no certainty that the present fuel will be available in two years' time, and as no substitute for German benzol is in view, it was decided to keep to the normal compression.

The mechanical changes are only of a carbureter nature. A much more intensive heating is adopted than is necessary for either gasolene or benzol, this heat being obtained both from the circulating water and from the exhaust. Carbureter needles are of nickel, and aluminum is avoided in the carbureters. At first 90 degree alcohol was used, but this has been changed to alcohol at 95 degrees, which has given much better results than the former.

According to engineers of the company, maintenance costs have increased 25 per cent. since this fuel was used, says a writer in *Motor Transport*. At the same time it has been ascertained that there has been no appreciably increased expenditure for spare parts during the last eleven months, the higher cost, therefore, being attributable to extra labor charges. No deteriorating effects have been found in the engine itself; in other words, the pistons, valves, and valve seatings have not suffered in any respects. Trouble has arisen, however, by reason of the corrosive action of the fuel when in a liquid condition, this action being different from that found with either benzol or alcohol used separately. Some of the old fuel tanks gave trouble and had to be repaired or replaced; when aluminum choke tubes were used they became welded to the body of the carbureter so that it was impossible to separate the two. Unless precautions were taken, all metal parts under the bonnet, such as exhaust collector, valve caps, carbureter rods and levers, became very badly rusted.

Flexibility is declared to be equal to that obtained with benzol only. There is no appreciable loss of power with a proper carbureter adjustment and sufficient heating of the charge. During cold weather difficulty is experienced in starting up, but no precautions are taken against this other than injecting with gasolene.

'Buses for Chicago?

Chicago's city administration had just about decided to experiment on a large scale with municipally-operated motor 'bus transportation at a 5-cent fare to take the place of street-car transportation when the strike of street and elevated railway employees, which prompted the experiment, was suddenly ended. Mayor Thompson, who was back of the plan, stated, however, that he would proceed with the movement to have the city operate 'buses.

Preceding the end of the strike Mayor Thompson had asked the city council to appropriate $3,000,000 for the purchase of 'buses. He announces that he will press this request, and the transportation committee of the council has decided to give it careful consideration.

Among the most outspoken advocates of the motor 'bus is Governor Len Small of Illinois, who issued the following statement in favor of municipally operated 'buses for Chicago:

"Mayor Thompson's establishment of people's ownership 5 cent fare motor 'bus service is a great thing for Chicago. It is more modern, more economical and faster than surface or "L" line electric trains."

Those acquainted with the political record of the Thompson and Small regimes do not anticipate any practical or tangible developments.

Signal Prices Reduced

Chassis prices of Signal trucks have been lowered as follows:

Model.	Old Price.	New Price.
1 -ton, NF	$1.950	$1.450
1½-ton, H	2.450	1.950
2½-ton, J	2.875	2.375
3½-ton, M	3.675	3.175
5 -ton, R	4.400	3.900

Long wheel-base forms of models J and M cost $100 extra.

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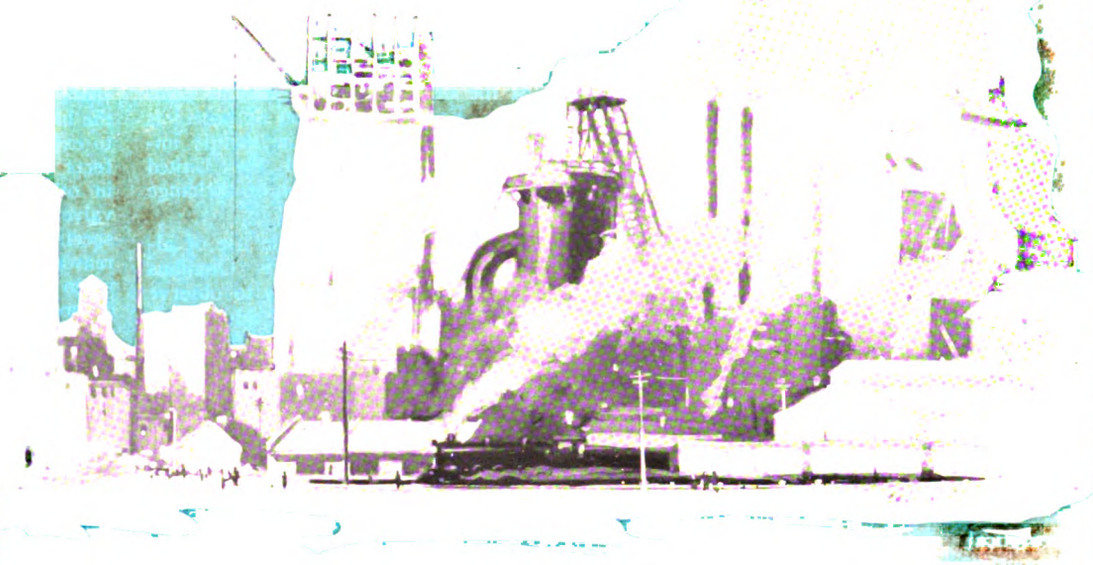

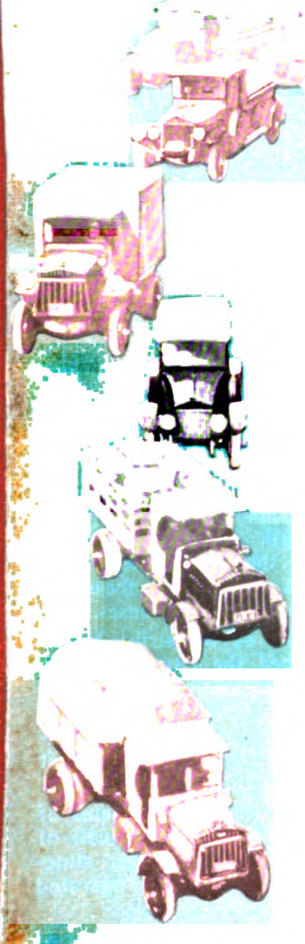

Opening the Road to a New Opportunity

BUSINESS is literally pleading for an intelligent, practical, specialized motor truck service. The motor truck is in the upswing of the tremendous renewed impetus behind all business.

The next few years will see the specialized truck dealer become a big merchant. It is conceded that the solution of growing transportation problems is a vast, mobile fleet of motor trucks economically built and properly serviced.

Recognizing this, a strong group of successful truck manufacturers have formed the Industrial Motors Corporation, and have joined their buying power, plant capacity and resources. This gives to dealers and users new advantages and economies.

The well-known Selden heavy duty trucks, and the popular Atlas "Merchants' Dispatch" speed truck are the first to be included in this new and powerful organization. Both Selden and Atlas are firmly established and widely popular.

Around the in-built qualities of these proven lines will be thrown a modern, intensive sales plan and the combined force of the entire group forming Industrial Motors.

INDUSTRIAL MOTORS
CORPORATION

SALES DIVISION: ROCHESTER, NEW YORK, U.S.A.

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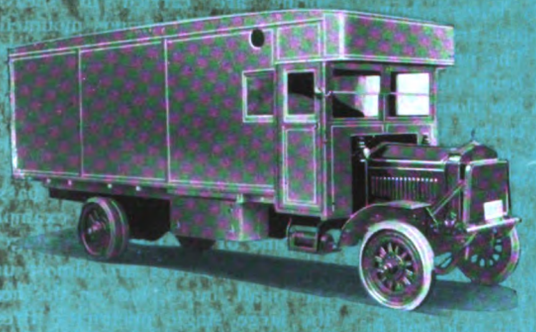
How A Small Investment Creates A Wide Field of Dealer Profits

YOU, Mr. Dealer, can now realize the profit possibilities of a big, rich field with small investment. You can sell and service every necessary truck unit. The Selden heavy-duty line meets every demand for a big truck with exclusive sales-clinching features of design and construction. The Atlas "Merchants' Dispatch" sells itself on the record of its performance.

Truck prospects want a permanent local responsibility, backed by a single organization big enough to give stability to it. Recognizing the importance of the dealer, Industrial Motors Corporation offers you a plan that permits you to become big and responsible from small beginnings.

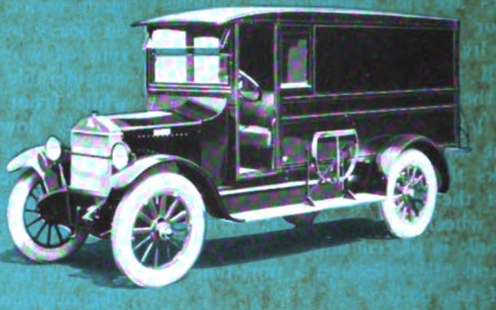
The Selden franchise has long been regarded as the model sales plan for constructive dealer development. It will now be applied to all in the Industrial Motors organization. With the low-priced and nationally popular Atlas "Merchants' Dispatch" in stock you find action and turnover in daily business. Sales of heavier units come automatically. You are specializing in truck transportation and have everything requisite to it.



Selden
Heavy Duty Trucks

Manufactured by Selden Truck Corporation
Division of Industrial Motors Corporation

Selden full-flexible construction is more than a trite selling phrase. It is a distinct engineering achievement that meets the stresses thrown constantly upon the heavy duty truck. It is a powerful sales argument wherever may be the prospect for a big truck. Selden performance is an established fact that any dealer can successfully merchandise.



WORM DRIVE ATLAS
"Merchants' Dispatch"

Manufactured by Atlas Truck Corporation
Division of Industrial Motors Corporation

Atlas "Merchants' Dispatch" is universally known as the speed truck with heavy duty stamina. The only worm-driven speed truck in the market. Unmistakably indicated where low-cost mileage, snappy performance, and continuous duty are required. Atlas chassis is the result of a specialized study of speed truck needs. Detail of finish makes the line.

INDUSTRIAL MOTORS
CORPORATION

SALES DIVISION: ROCHESTER, NEW YORK, U.S.A.

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Chassis Design for 'Bus Service

By R. E. PLIMPTON

THE principal parts of the 'bus chassis savor strongly of motor truck practice, and 'bus individuality is gained by such features as more powerful engines, longer springs, battery and lighting generator and the like. Four-cylinder engines with L-heads are used on the majority of 'buses. A few designs for city service have sleeve-valve units. Some I-head types are being supplied, mainly for the fast intercity work. Many operators are talking in favor of six cylinders, because of the smoothness and flexibility they assure.

The data given in the table indicate that engine speeds of from 1,400 to 1,800 r. p. m. are common, at least for city 'buses. These speeds need not be maintained for long periods, but they are essential, as is also quick acceleration, for threading city traffic, passing other vehicles on the open road and maintaining schedules when stops are frequent. Quiet operation at slow speeds is essential also.

Governors are not common on vehicles designed for 'bus operation. A driver to whom the lives of passengers can be entrusted will not require a governor to safeguard the vehicle.

In many localities the law requires that the gasolene tank be filled from outside the 'bus. Tanks therefore are being placed at the rear of the frame, or at the side between the wheels. In another arrangement the tank is placed under the floor of the body, and filled through a port-hole in the side of the body.

Ignition is mainly by magneto, this being favored by many operators because a magneto is easy to replace. With the growing practice of installing a battery and a lighting generator, battery ignition is likely to be given more consideration.

Thermo-siphon and pump circulation are both used on 'buses. The latter system is used in the majority of the designs listed in the table. Radiators with replaceable cores are being developed for 'bus service. They illustrate the tendency to provide parts that will decrease the time required for adjustments or repairs.

The exhaust system is usually fitted with a valve connection so that the body-builder can install a heating system. The end of the exhaust pipe, and this also applies to heater outlets, should be placed at the extreme rear so that the gases are discharged back of the body and not underneath it.

A smoothly operating clutch is an essential on 'buses. Jars and jerks not only increase maintenance costs but they mean also continual discomfort to passengers. The service is so severe that this unit should be of liberal size.

'Bus transmissions as a rule are of the 4-speed sliding-gear type. They should be designed to stand up under a service involving 10 or more stops per mile and upward of 50,000 miles of operation in a year. The strain is intensified if the driver jumps to second or third speed when starting.

The maximum speed should be just high enough to maintain schedules from a transportation point of view, with a fair margin allowed to make up lost time. Passenger comfort requires steps between gears that are as nearly equal as possible. The low-gear speed must have power enough also to pull the vehicle through loose dirt, mud or snow.

Universal-joint design is especially important in the long-wheel-base 'bus. Bearing supports as well as extra joints are used to overcome the whipping effect of the long propeller-shafts. The angularity of these shafts is comparatively slight, so that full advantage can be taken of the shock-absorbing properties of the fabric joint.

The rear axle for the city 'buses is being made wider, of 72 and 74-inch track, than on heavy motor vehicles. The underslung type of worm-gear axle is being used to a considerable extent to gain low floor-levels, while front axles with a center dropped sharply down between the pads and the yokes are being provided for city service.

Frame construction and proportions have been influenced appreciably by the development of the city-type 'bus. The law limits the overall width, so the 'bus body has had to be lengthened to get capacity. The overhang beyond the rear axle and in the back of the frame is limited also by considerations of safety and good design. All this has led to the long wheel-base, which seems to be longer with every new design. Frame sections have had to be made deeper on account of the great distance between the wheels. The frames have been widened at the same time to care for the 7 and 8-foot bodies they must support. The demand for low floors has again been taken out on the frame, which is made with a kick-up over the rear axle so that the central part can be kept close to the ground. On one new design this kick-up is found at both the front and the rear axles.

Owing to the severe service and the need for the utmost safety, the steering-gear and the brakes should be heavier even than for truck designs. Easy steering is important to save the driver's strength.

A propeller-shaft brake is used on a number of 'bus models, undoubtedly because of its simplicity and the ease of securing equal braking on the rear wheels. On the Pacific Coast four-wheel hydraulic brakes have been tried for reasons of safety and to increase the life of the rear-wheel tires. The four-wheel air-brakes now being developed for heavy motor vehicles should be useful for large 'buses also.

Riding comfort is a 'bus requirement that has received close attention in the new designs. While underslung springs are installed principally to lower the 'bus floor, they undoubtedly improve the riding qualities of the vehicle. The change in wheel-base length that occurs on one side when one wheel strikes an obstruction is much less with the underslung construction, because the center of the rear axle is almost in line horizontally with the front eye of the spring, instead of being several inches below it, as with the conventional overhung construction.

Most of the 'bus designs have an auxiliary suspension that comes into play with heavy loads or severe road-shocks. The simplest is the so-called progressive spring, with extra leaves mounted below the main spring but at a flatter camber. Much the same effect is secured on the London 'buses by a volute spring attached to a bracket on the frame; or, the ends of the main spring are carried in sheaves, rubber blocks or small springs mounted inside the hangers. While these devices are used particularly on the rear springs, the front axle also is being better sprung, not only to protect the engine, but to carry the heavier loads thrown forward by the long wheel-base. Another method is to use the shock-absorbers developed for passenger-cars. The pneumatic type, for example, is fitted to some of the California stages.

Pneumatic tires are almost universal on the small 'buses, but on the heavier types the large single pneumatic tires have the disadvantage of throwing the body high up into the air. This is being overcome by the application of dual tires on the rear wheels, which permits the use of six tires of the same size. The development of the "doughnut" design will help here, provided the brake diameters can be decreased to correspond.

Many operators in the cities are using solid or cushion tires, mounted on a resilient rim or cushion wheel. This combination seems to work out satisfactorily on fairly good pavements, although it is has proved too heavy for the rear-axle mechanism on certain 'buses working over rough roads.

The old horse-drawn stages undoubtedly furnished the inspiration for modern 'bus bodies, and later technique seemed to be based also on the bodies built for motor trucks. At any rate, many of the first bodies were heavier than necessary for either economy or comfort. The timbers were too large, the ironing was too heavy and too much of it was used. Then cheaper bodies were demanded; the pendulum swung too far the other way; 'bus bodies loosened up and became noisy; they began to fall to pieces and repelled instead of attracting passengers.

At first quantity production of 'bus bodies was difficult because chassis mounting dimensions were not standardized.

[Read before the Society of Automotive Engineers.—ED.]

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Frame widths and lengths, the location and the dimensions of rear wheels, the position of drivers' seats and controls and the height of the frame from the ground all seem to be different on every chassis. 'Bus bodies are now being turned out in quantities, however, partly because the sills can be altered to fit different chassis, and partly because of the great increase in the demand. The price and the weight have been decreased greatly, and, at the same time, there have been many improvements in detail construction.

The mounting on the chassis usually is designed to keep the floor as near the ground as possible. Many bodies now are set directly on the frame, so that the floor is only its own thickness higher. Longitudinal sills are placed between the frame side-members and supported between them. The part of the body projecting beyond the frame may be carried on cross-straps that extend the full width and are supported at the ends by pressed or built-up brackets riveted to the side-members; or the support may consist of channels carried across under the main frame and bent so as to carry the outside edges of the body. These are riveted to the side-members by structural shapes.

In general 'bus bodies are built up on a hardwood framing of ash or oak. Dies for the all-metal body would be too expensive, even should such construction stand the weaving and twisting to which flexible chassis frames subject it.

Panel material may be wood, sheet-metal or composition. Sheet-metal is applied usually as a sheathing, as is also sheet-aluminum. A good veneer, protected on the outside by sheet-steel, is sometimes used. This material, it is claimed, has the resiliency of wood and the easily finished surface of sheet-metal. This veneer, or plywood, is also made up as roofs, or used as a ceiling to furnish a smooth surface over roofs of tongue-and-groove board.

Climatic conditions and local preferences both seem to determine the type of body used in any given section. The open body is popular in England, where it is fitted to so-called motor coaches or chars-a-bancs. The seats are unbroken across the body and are reached by individual doors. As a rule the roof can be folded back. In this country such a vehicle is favored in the South and on the Pacific Coast; also it is used in large cities and in the national parks where sight-seeing is the reason for presence of the 'bus. Sight-seeing 'buses work mostly in warm weather, but in some parts of the country, as in New York State, an open convertible body is used the year around. This has a permanent roof supported on pillars that are built into the sides of the seats. The open sides are covered by double curtains during the winter.

The closed type of body is found generally through the north, east and central parts of the country. This body, with two longitudinal seats, is popular with operators because of its wide central aisle, large capacity for standing passengers and good ability to load and unload passengers. The longitudinal type is not so comfortable on long runs of 30 minutes or more, where the passengers settle down and are not boarding or alighting at frequent intervals. In country service and for large single-deckers in city or intercity work, it is being replaced by an arrangement in which both cross and longitudinal seats are used.

The success of most transportation systems depends upon their ability to attract a group of riders who travel not of necessity but because the service given is attractive and its use is a pleasure. This profit-making group is attracted by good looking 'buses with pleasing lines, and also by steps, doors and seats that are comfortable and convenient.

The first convenience factor is on the outside of the body. The color of the paint has transportation value. Where 'buses are numerous, each route or line can use a distinctive color, so that patrons can recognize it easily. The electric railways operating 'buses are naturally painting them the same color as their rail equipment. In Bridgeport, Connecticut, all the 'buses are painted the same color, but the belt rail is painted a distinctive color on each line. This stripe running around the outside identifies each route clearly.

To secure high visibility the 'buses of the Toronto Transportation Commission are painted a sagamore red. It is believed that this color induces both employees and passengers to keep the paint on the vehicles in better condition, and that accidents are reduced because the operators of other vehicles exercise greater care.

The would-be passenger, having picked out the right 'bus, is now ready to enter; but first he must allow passengers to alight, since it is not practicable to provide door space for two conflicting streams of travel. If he is to enter comfortably the actual step-height will not be more than 15 inches,

CONDENSED SPECIFICATIONS OF TYPICAL CITY 'BUSES.

Item.	London General Omnibus Company's Type S*	Fifth Avenue Coach Company's Type L*	Imperial	Fifth Avenue Coach Company's Type J	Mack	Republic	White	Duplex	Fageol
Number of seats	54	51	30	25	25	25	25	23	20
Floor height at door	31"	18"	26½"	25"	32"	28"	28"	27"	18½"
Wheel-base	179"	175"	195"	172"	180"	168"	198"	160"	188"
Track, front wheels	72½"	67"	66½"	68"	58¼"	66"	58½"	56"	70"
Track, rear wheels	70"	72"	71"	71¼"	60"	66"	60¾"	62"	70"
Total weight, pounds	9,380	10,150	9,500	6,900	8,850	7,900	8,900	6,500	6,800
Body weight, pounds	2,800	4,000	3,000	2,100	2,700	2,400	3,500	2,300	1,600
Engine bore and stroke	4.26x5.51"	4x6"	4⅛x5¼"	4x6"	4¼x5"	4⅛x5½"	4¼x5¾"	4x5¼"	4¼x5½"
Valves	L-head	Sleeve	I-head	Sleeve	L-head	Sleeve	L-head	L-head	I-head
Engine speed, r.p.m.	1,050	1,400	1,600	1,400	1,275	1,800	1,650	1,600	1,800
Horse-power	34	50	47½	50	37	50	50	42	62
Fuel capacity, gallons	25	40	30	35	25	30	35	25	28
Fuel feed	Vacuum	Gravity	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum
Carbureter	Zenith	Zenith Spl.	Zenith	Zenith Spl.	Schebler	Float-feed	Own	Stromberg	Zenith
Cooling system	Pump	Thermo-s	Pump	Thermo-s	Pump	Thermo-s	Pump	Pump	Pump
Radiator	Tubular	Tubular	Tubular	Tubular	Cellular	Tubular	Cellular	Cellular	Cellular
Ignition	Magneto	Magneto	Magneto	Magneto	Magneto	Magneto	Magneto	Battery	Battery
Clutch	Plate	Plate	Mult. Disk	Plate	Mult. Disk	Mult. Disk	Plate	Mult. Disk	Mult. Disk
Forward speeds	3	4	4	4	4	4	4	4	4
Control	Center	Side	Center	Side	Center	Center	Center	Center	Center
Universal-joints	Met. & Fab.	Fabric	Metal	Fabric	Metal	Metal	Metal	Metal	Met. & Fab.
Steering-gear	Worm-nut	Worm-nut	Screw-nut	Worm-nut	Worm-gear	Worm-nut	Worm-sect.	Worm-nut	Worm-nut
Front axle	I-beam	I-beam	I-beam	I-beam	I-beam	I-beam	I-beam	I-beam	I-beam
Rear axle	Worm	Intern-gr.	Intern-gr.	Worn	Dbl. Reduc.	Intern-gr.	Dbl. Reduc.	Worm	Worm
Wheels	Steel	Steel	Steel	Steel	Wood	Wood Cush.	Steel	Wood	Steel
Front tires	Solid	Solid	Cushion	Cushion	Cushion	Cushion	Solid	Pneumatic	Pneumatic
Front tire size	41.3x4.73"	34x5"	36x6"	34x4"	34x5"	34x4"	36x4"	35x5"	36x6"
Rear tires	Solid dual	Solid dual	Cush. dual	Cushion	Cush. dual	Cushion	Solid	Pneumatic	Pneumatic
Rear tire size	41.3x4.73"	34x5"	36x6"	34x6"	34x5"	34x8"	36x7"	38x7"	36x6"
Springs	½ ell and auxiliary	½ ellipt. progressv.	½ ellipt. undrslung	½ ellipt. progressv	½ ell. and rubr. blks.	½ ellipt.	½ ellipt.	½ ell. and snubbers	½ ellipt. undrslung
Brakes	Rear whls.	Shaft & rear whls.	Shaft & rear whls.	Rear whls.	Shaft & rear whls.	Shaft & rear whls.	Shaft & rear whls.	Rear whls.	Rear whls.

*Double-decked.

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although from 4 to 6 inches can be gained by curb-loading. Tests on trolley-cars have proved that 15 inches should be the maximum step-height. Three steps, with one 16-inch and two 14-inch risers, showed an average loading and unloading time of 2.5 seconds per passenger. This was cut to 1.75 seconds per passenger, however, when the change was made to one 15-inch and three 10-inch risers, each of the four being slightly wider than the three used in the first test.

The width of steps should be at least 12 inches, although this is often limited because of the necessity of keeping within the body lines, and clear of the chassis frame. The steps should be shod with safety tread, for the good of the passengers and to prevent wear. In current designs, the steps are of permanent construction, the outside folding type can be used but is not particularly satisfactory as regards durability or safety. Two steps only are needed with the low-frame 'buses, and these can be arranged to fit in the body very nicely.

The simplest form of door, assuming that the entrance is covered at all, is the collapsible gate used in southern California. But more substantial construction is required in many parts of the country. Several types of door are available. The sliding door frees the full width of the entrance, but makes necessary any expensive opening in the body. Two-leaf folding or jack-knife doors are therefore in more general use. These fold inward as a rule, as the outward folding type is frowned upon by the law-makers. Hinges at the front permit carrying the opening mechanism across to a handle that can be operated by the driver. The opening of the door may automatically turn on the step light at night.

The service door seems to be one of the most difficult parts of the body to keep in good working order. The trouble is usually in the door itself, although the manual operating mechanism may get out of order at times. On many 'buses the driver spends a good part of his time, often when he should be watching the road ahead of the moving vehicle, in trying to force a sticky door open or closed.

Doors should be at least 30 inches wide, although in practice they vary from 22 to 35 inches. This can be compared with the exit-entrance of the one-man type of trolley-car, which is about 52 inches wide; but, as was said before, space is too valuable in the 'bus to provide a door that will carry two streams of passengers.

Seats in the 'bus should be arranged in accordance with traffic conditions rather than the design of the vehicle chassis. The latter sometimes has to control, however, as in the placing of longitudinal seats over the wheel-housings. The result is a well at the rear of the vehicle, which must be reached through the neck of the bottle formed by the central aisle. This well is sometimes needed, but it is often used when the space should be filled with seats.

The standard cross-seat is 15 inches wide and 32 or 34 inches long. The central aisle is from 14 to 24 inches wide. The 34-inch seat is the better, since the narrower seat will not in reality allow the use of wider aisles. At the same time it may be uncomfortable for two persons. The real aisle-clearance is between the hips and shoulders of the seated passengers. With the 15-inch width, seat centers should be at least 28½ inches, which gives only about 11-inch knee room. These seat centers should coincide with side-post centers.

Seat construction has settled down to the spring type for cushions; springs are sometimes, although rarely, used in the backs. A patented seat, which is said to have given satisfaction on a 30-passenger 'bus, is supported on two pedestals, each of which is a pneumatic cylinder or dashpot. This really amounts to a shock-absorber directly applied to each seat.

Seat covers are of rattan ordinarily with plush or leather for de luxe designs. Rattan is low in first cost and can be kept clean more easily. It is somewhat slippery, but this can be taken care of by the seat design by raising the cushion at the front and recessing the back slightly. This gives more knee room and comfort, and tends to hold the passengers firmly in place, even over rough roads.

Floor coverings of carpet or lioleum are found on some vehicles, but for wear and hard service the floor is slatted, in the aisles and between the seats. The slats can be attached to flat strips of steel, from which they can be removed when worn. This scheme, which has been used in England, is said to make cleaning easier also.

The driver's comfort is as important as passenger comfort, and is taken good care of in the new designs. The seat is of bucket shape with good springs, and sometimes has an adjustment for height. A railing is placed so that passengers can not crowd against the driver, wind- and sunshields are attached on the outside and a curtain or bulkhead prevents light from the rear being reflected on the wind-shield.

A heating system, using the exhaust gases from the engine, is installed on most 'buses put out within the last year or so. Previous to that, however, many 'buses carried small stoves during the winter months, which of course were unsafe and insanitary. The first exhaust systems were makeshifts, with the gases led through pipes inside the body. While this was often effective, or at least provided satisfactory heating, it was a clumsy arrangement, hard to control and difficult to keep gas-tight. It was used, however, because operators claimed they could not get heaters of sufficient capacity, at least for large 'buses.

The problem seems to have been solved by the use of two heaters, placed close to the front of the body. The inlets for these join in a single connection to the exhaust pipe, through a valve controlled by a lever inserted in the floor-boards near the driver. Because of the compact arrangement no provision is made for insulating the tubing leading to the heaters.

Good interior lighting is essential where passengers have the evening newspaper habit, although in country service, where the 'buses are used at night only on Saturday, it may not be necessary. Good lighting is needed also for displaying advertising cards, which promise to be a considerable source of income to the 'bus operator.

The 2-candlepower bulbs used in so many 'buses may help in collecting fares, but are of little service to passengers. It is recognized now that larger generating and battery capacity must be installed. The 300-watt generator system for the Fifth Avenue Coach Company 'buses, although in some respects a special job, indicates that the larger equipment is available. The 12-volt battery system seems to have found a place, although the 6-volt design is used widely.

The present tendency is to mount dome reflectors on account of the low head room. Prismatic and opal reflectors have been designed however for 'bus service. These require practically no more head room space and are said to be much more efficient than the domes. The large 'buses are being fitted with six to eight bulbs, of from 21 to 32 candlepower.

Identification at night is a requirement peculiar to the 'bus. Many designs are fitted with a bull's-eye, of special color, at the top of the roof in front. This permits the would-be passenger to pick out the 'bus when it is some distance away, and the bull's-eye lights up the destination sign when the 'bus comes closer. Purple and green running lights serve the same purpose.

'Bus ventilation, in its simplest form, depends upon the service door for the admission of fresh air, and upon vents at the sides or the rear to exhaust polluted air. Most doors admit a slight amount of air even when closed, unless they overlap at the top and bottom, when they are practically draftproof. Air is admitted also through openings across the front of the body, above the driver.

The latest practice is to insert ventilators along the center of the roof, with a screen or grating in the ceiling. These ventilators may be automatic in operation, not requiring any adjustment; rain can not enter but the air exit is always ready for service. Windows are being equipped with adjustable curtains and sash, safety catches, rubber weather-strips, anti-rattlers and upper stationary sash with Florentine glass. Wire grating or wood slats are placed outside to keep each passenger wholly inside the 'bus.

Pockets for windows are of two types. The overhead pocket requires good head room, and heavy top construction with a higher center of gravity. Then there is the side-pocket type that takes up valuable space needed for seats and aisles. The overhead opening seems to be favored, undoubtedly because the windows are easier to handle.

The collection of fares, while more of a traffic than an equipment matter, is giving much trouble to 'bus operators. The necessity for simplicity and accuracy has led to the application of mechanical devices to save work for the driver, insure his honesty and speed up service.

A money-changer, fastened to the side of the 'bus or at some other convenient place, is the first step; next some type of farebox, with perhaps an overhead register that the driver pulls to record fares. The

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Intercity 'Bus Service at 1.5 Cent a Passenger-Mile

By CHARLES H. AKER

Schenectady, New York

MY 1½-ton 'bus is earning a net profit aggregating $2,275 a year, in addition to my wages as driver. It has made as high as 225 miles on a Sunday, and usually brings in $90 for its work on Saturday and Sunday alone. Sometimes we get $60 for one day's work. My 'bus hasn't lost a single day for repairs in its six month's operation, and the only expense has been the change of one spark plug.

The machine is very economical to operate. We get at least 9 miles to a gallon of gasolene, and the average operating expense amounts to only $15.31 per day, including my wages as driver. This is low in comparison with the average income of $125 a week. The roads are good around here, but there are some stiff hills.

The 'bus has no regular route, but I have been able to build up a profitable business by catering to picnics, dances, baseball teams baseball "fans," and working men who live a long way from their work. Over the week ends the trucks, hauls people to picnics at nearby resorts. During the week it is principally occupied in hauling workingmen.

At present we are hauling the Adirondack Light & Power Company employees to and from their homes in Amsterdam, 3 miles each way. We carry a maximum of 35 people per trip, though the 'bus seats only 16, and get 10c a passenger. We also haul workmen morning and evening on a stone-crushing job in Pattersonville, 10 miles each way. We usually carry about 18 men each way, at 20 cents per passenger.

On picnics we start out anywhere between 8 and 11 o'clock in the morning, and stay out all day, bringingt the people home at night. We carry between 18 and 26 passengers to a load, averaging 22. The longest trip was to Sherrel, near Utica, when we hauled a baseball team 81 miles each way. We carried 18 men and received $60. The trip took from 8 o'clock in the morning until 12 midnight, making it necessary to charge two days driver's wages. The total cost was $35.38 and net profit was $24.62. The cost of hauling a picnic to Saratoga Lake, 36 miles each way from Amsterdam, is $17.11. As we get $1.50 a passenger for 22 passengers, or $33 the net profit is $15.89. On a trip to Carough Lake. 24 miles each way, the cost is $13.50, and the income at $1.25 per passenger is $27.50, making the net profit $14.00.

In general the profit on picnics and other long hauls runs around 100 per cent,, but on hauling workmen the profit is not so great. On this work, however, we increase our income by hauling loads both ways. In fact, we figure that the truck is loaded both ways at least half the time.

As soon as our business warrants it we expect to buy another 'bus. It is merely a matter of becoming well enough known so that there is a big demand for our service. We are figuring on doing a lot of display advertising, and letting the world know that we have an unsual 'bus service to offer.

We hope soon to have a franchise for a regular run, in fact I purchased the truck with that in view, but in the mean time I am making the truck pay a profit. Notice the rates of fare charged.

Hauling employees 3 miles each way—$0.10 per passenger per trip.

Hauling workmen 10 miles each way—$0.20 per passenger per trip.

Hauling ballteam 162 miles round trip—$60.00 for trip.

Hauling picnic 72 miles round trip—$1.50 per passenger.

Hauling picnic 48 miles round trip—$1.25 per passenger.

The truck has operated for $15.31 on an average 60-mile day. As it hauls on such a day 66 passengers the cost is 23 cents per passenger carried on a 30-mile round trip, or 1½ cents per passenger-mile.

We have averaged $2,275.00 per year net profit in addition to a driver's wage of $4.71 per day. Our truck has required no repairs for the 8,280 miles traveled, although in figuring costs we allow 2.4 cents per mile for maintenance.

Itemized costs follow:

OPERATING RECORDS.

Total Period.

Period covered, months	6
Days operated	138
Total round trips	276
Loads, both ways, passengers	9,108
Miles traveled	8,280
Gasolene, gallons used	920
Cylinder oil, gallons used	51¾

Daily Averages.

Round trips	2
Passengers both ways	66
Miles traveled	60
Miles per round trip	30
Load per trip, passengers	33
Passenger-miles	990
Miles per gallon gasolene	9
Miles per gallon oil	160

COST RECORDS.

Investments.

Chassis	$2,350.00
Body	1,400.00
Two spare tires	173.30
Total	$3,923.30
Tire value	346.60
Total, less tires, to be deprecited.	$3,576.70

Fixed Charges—Yearly.

Interest on total investment (4 years) @ 7%	$ 171.64
Taxes and licenses	64.00
Insurance	76.00
Garage expenses	120.00
Total per annum	$ 431.64
Total per month (per day ($1.56)	35.94
Total for period	215.82

Variable Charges—Period.

Fuel at 24 cents a gallon	$ 220.80
Cylinder oil at $1.00 a gallon	51.75
Tires (8,280 miles) ($346.60÷9,000-miles life)	318.78
Depreciation, 8,280 miles ($3,576.70 ÷65,000-mile life)	455.40
Maintenance and repairs (estimated)	200.00
Total variable charges (per day $9.03)	$1,246.73
Driver's wages (per day $4.71)	650.00
Total fixed charges	215.82
Total operating cost	$2,112.55

Unit Costs.

Cost per day operated	$ 15.30
Cost per mile traveled	.255
Cost per passenger hauled	.232
Cost per passenger-mile	.015
Repair cost per mile, estimated	.024

latest arrangement is what may be described as an instantaneous registering lamp-post type of fare-collection device. This records each fare as deposited, and is driven by a flexible shaft connected to one of the accessories on the 'bus engine. The use of such a mechanism should make unnecessary the regulations that forbid the driver to collect fares while the vehicle is in motion.

Parts Sales to Date

Sales by members of the Motor & Accessory Manufacturers' Association for the first half of 1922 aggregated $187,500,000, as compared with $113,000,000 for the same period in 1921. Sales for June of this year were nearly double those of June, 1921. Business was almost on the same level as in May.

While business has been climbing upward there has been a sharp decrease in the volume of past due accounts. The total at the end of June, 1921, was $4,720,000 and at the end of last June it was nearly $2,840,000.

The following table shows the sales by members of the association, the total of past due accounts and the total of notes held for all the months of 1921 and the first six months of 1922:

	Sales		Past Due		Notes Outstanding	
	Total.	Per Cent. Change.	Total.	Per Cent. Change.	Total.	Per Cent. Change.
1921.						
January	$ 6,264,587	.....	$ 8,099,727	.....	$ 4,359,871	.....
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,063,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922.						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.5 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.5 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5. Dec.

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What Worries the Interurbans

By PRENTIS HARDY

IF you ask the average interurban railway manager what his greatest problem is, he will probably tell you, after eliminating labor and material costs and public regulation, that the menace of motor truck and motor 'bus competition is enough to keep the most placid optimist awake nights. And he will volunteer the further statement that, whereas the city street-railway may view motor 'bus competition as a developer of traffic that will later prove a benefit to it, the interurban operator considers competing motor vehicles pirate craft, seeking to divert to their owners' coffers business that has been developed solely by the rail lines. And when it comes to a consideration of rights-of-way, he will wax wroth at mere mention of the fact that his new rivals are furnished with a free roadbed and are in other ways absolved from the heavy burdens placed upon the railways by the public, while the rail lines are forced to contribute to the up-keep of the highways on which their competitors are free to run much as they please.

In order to learn what interurban executives think of the problem facing their business, the director of the advertising section of the American Electric Railway Association recently sent a questionnaire to the managers of practically every interurban road in the country. Replies were received from the following companies, among others, and the frequency with which motor competition appeared in their responses indicates the gravity of the situation in the interurban operator's eyes: Winona Interurban Railway Company, Warsaw, Indiana; Chicago, South Bend & Northern Indiana Railway Company, South Bend, Indiana; Interstate Public Service Company, Indianapolis; Waterloo, Cedar Falls & Northern Railway Company, Waterloo, Iowa; Illinios Traction System, Peoria, Illinois: San Francisco, Napa & Calistoga Railway, Napa, California; Washington & Old Dominion Railway, Washington, D. C.; Pacific Electric Railway Company, Los Angeles; Indianapolis Street Railway Company; Union Traction Company of Indiana, Anderson, Indiana.

The general manager of a railroad that is now in the hands of a receiver attributes his company's condition largely, if not entirely, to the loss of business through the competitive operations of motor services. The privately-owned motor car comes in for its share of condemnation and more particularly that owned by the farmer, who has ceased to be an interurban patron in most cases.

"Interurban operations are gradually taking on the aspects of steam line transportation," he says. "Passenger-cars are being operated long distances. With the advent of the automobile it would seem that short-haul traffic on interurban lines is a thing of the past. On the 70 miles we operate between two fairly large centers, less than one-half of 1 per cent. of our passenger traffic comes from country stops. Ten years ago this business ran as high as 17 per cent. of the gross. It is our opinion that the salvation of the interurban properties lies in promoting long-distance travel with big, roomy cars and a strenuous development of the freight traffic. Our freight revenue has shown a substantial increase every year during the past ten years, and it is our opinion that whenever we get the freight revenue up to 50 per cent. of the gross earnings, the future of interurban lines will be insured."

Another executive, traffic manager of a middle western line, speaks in a similar vein, although he attaches more blame to the individual motor car than to the public-carrier motor 'bus. He says:

"Our problems are relatively the same as those of the city lines which have been harassed by 'jitneys.' Some eight or ten 'buses are operating from a city 21 miles from our biggest center, over a hard-surface state highway. A careful investigation of the amount of business done by these 'buses reveals some facts that are perhaps not known to the average interurban traffic man unless he has made investigation. In our case I find that our loss of short-haul passenger business is not all chargeable to the 'bus. I made several trips over this territory in an automobile and made a personal check, with this finding: in our opinion our heavy loss does not come from the 'bus but from the privately-owned car. While it is true that the 'buses are handling quite a number of former commuters over the line, we also find that a large number of our former commuters own their own small cars, and not only transport themselves but their friends. I believe this is true of most of the territory infested with 'buses.

"We are showing steady increases in our freight business, in face of the fact that a number of freight trucks hauling a large amount of tonnage between points on our line. We are using some advertising matter that is being posted in our waiting rooms and country stops, under the caption, 'Travel and Ship by Traction and Save the Highways.' While I believe publicity along these lines will help to a certain extent, I think the 'bus problem and the freight truck problem on the highways must be settled by the taxpayers throughout the state through legislative channels."

There seems to be great difficulty in impressing the public with the merits of railway transportation in face of the superior service offered by motor 'buse. Says one interurban manager on this phase of the subject:

"I would say that the outstanding interurban problem in this territory as distinguished from city railway problems is to induce the public to use our interurban cars instead of using 'buses or automobiles. I have been searching for a remedy for this particular kind of illness, and I haven't found it. It would be very fine if we could, over night, build an interurban roadbed as smooth as a floor and then put on brand new light-weight interurban cars, but as I am not Aladdin, nor have I yet found his lamp, I don't see how I am going to do it.

"Until the traveling public gets through the period when motor 'bus is a novelty, I suppose a good many people are going to continue to ride in the 'buses. After a while the newness will wear off, and if we keep up our rolling stock and service we will probably get a portion of the traffic back again. I also believe the public service commissions of the several states will see the justice of protecting investments that have been made in interurban properties, and will take measures to prevent 'bus competition where the electric railway service is adequate for the needs of the communities served."

Another executive evinces great hope in the power of legislation which may prove of value in equalizing the burdens placed on the two forms of transportation service —rail and highway.

"The interurban railways are subjected to the same economic pressure that has affected all other lines of business, and, in addition, are being subjected to a constantly increasing pressure from the recently developed transportation unit, the motor 'bus and the motor truck," he says. "Eventually these new transportation units will find their level. Up to now they have been quite largely experimental, and almost entirely unregulated. Legislation designed to protect public highways from disintegration caused by the indiscriminate use of these vehicles will to a large extent equalize the transportation conditions between these new agencies and the old interurban, and when this time comes the interurban lines will be relieved of a large part of the pressure that is now upon them.

"This equalization will be brought about by laws that will require a motor vehicle common carrier using the public highway to pay such a special tax as will maintain and repair the public highways which are used. It should not be difficult to obtain this sort of legislation. The taxpayers are interested because they pay for the roads and there is no economic justice or reason in furnishing permanent public highways free to motor vehicle common carriers.

"When a special tax has been placed on these motor vehicle common carriers and transportation conditions have been somewhat equalized it will be found that the interurban railway, as a rule, will continue to furnish the most reliable and cheapest form of transportation. It is my opinion that one of the biggest problems before the industry as a whole at present is building the ground work for the adoption by state legislatures of legislation of the character I have mentioned."

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From California—a hotbed of railway and motor 'bus rivalry—comes the following expression of opinion:

"If equity ever existed in the matter of any electric railway paving a large portion of the public highway, and thereby compelling the patrons of the railway to contribute directly to an expense from which they receive no benefit, the theory of such an equity certainly could not apply to strictly interurban railways, because, as a matter of fact, the major part of the fares collected on an interurban line is not in payment for actual service rendered the passenger over the sections of track encumbered with such paving expense.

"An urgent need of the short-line railways situated as this one is, or similar to this one, is the establishment of a fair and just system of taxation, one which will not discriminate against the permanent investment in favor of a competitor, such as the organized stage industry operating as a public utility over highways built by the people, a large part of the cost of construction of which is contributed by the interurban railway's patrons through the present system of taxation on the price of his transportation.

"This competitor does not assume or pretend to supplant the service of the interurban by offering the traveling public the same advantages of service, but selects only the profitable portion, a situation which eventually will make the railway financially unable to furnish the cheaper classes of transportation, a service which, as we have stated, the motor 'bus does not attempt to give.

"Another matter which we believe has not been sufficiently considered is the fact that in California, as well as in some other states, there are laws which require interurban railways to employ in the operation of their trains only men who have attained certain qualifications by experience, whereas the 'bus and truck lines are permitted to hire men to whom the handling of human lives is entrusted without the least consideration of the man's physical, moral or social fitness."

Other expressions of opinion exhibit the same kind and intensity of feeling against the motor vehicle and indicate that, in the minds of railway men, the surest avenue of relief lies in the direction of the statehouse where the motor truck and motor 'bus can be placed under some form of restriction that will amount practically to prohibition. By placing motor trucks and 'buses engaged in intercity traffic under the control of the state public service commissions, which always may be counted on to display very tender regard for public utility interests, the interurban railroads hope to be able to stem the tide of motor competition. How far they have been successful up to date in obtaining the beginnings of prohibitory laws may be seen from the recent analysis of state laws regulating motor carriers published in these columns last May, and how far they may be able to go in the future may be imagined by anyone who is familiar with the manner in which public service commissions have upheld the railways' contentions for higher rates and fewer restrictions on operation.

Traveling Grocery Stores Now at Work in Columbus

By J. R. COMPTON

A COMPARATIVELY new system of selling has recently been launched at Columbus, Ohio, by the Modern System Grocery Company. The plan is to take the store to the consumer, instead of the more common method of the customer coming to the store. The company already has ten of these rolling stores in operation in Columbus, with every indication that the number will be largely increased within the next few months.

The body used in the rolling store is 8 feet wide, 20 feet long, and 6 feet high, mounted on a 2½-ton Acme chassis, with a 12-inch monitor top which lets in the light and provides ventilation. The body is painted white, then enameled.

Entrance to the store is at the rear and as the customer enters she picks out the merchandise desired, all the stock being packaged goods, which requires no wrapping. She then moves up toward the front of the truck, where the driver is seated, a cash register by his side. After paying for the goods selected the customer leaves the store by a front doorway used exclusively as an exit. The merchandise is attractively displayed. A very complete stock is carried, including butter, eggs, vegetables of various kinds, canned milk, and all the regular staples. Just to illustrate the completeness of the stock there are six different nationally advertised brands of baking powder in stock.

The truck is equipped with an efficient refrigerator system for those commodities requiring cooling. Smoked meats of many different kinds are carried by the store, but no fresh meat.

But one man is carried on this truck, he being an experienced grocery clerk and also acting as driver.

The value of the stock carried varies from $800 to $1,000. Daily sales will amount to from $100 to $150, so the stock will turn itself about every ten days.

Each store will operate daily the year around over a carefully planned route and follows quite closely a time table, so as to be in the same block at the same time each day. At the present time the stores are operating in the city only, each covering a route from 4 to 12 miles in length.

A warehouse is maintained by the company where the trucks are driven at the end of the day's trip. Stocks are replenished at night and trucks made ready for the next day. A supply truck is operated and its routing is so regulated that each one of the rolling stores is visited by the supply truck and such stocks as are found to be getting low are replenished. The supply truck's visit to the rolling store is planned so as to meet it either just before or just after the store reaches the point on its route where the greatest volume of sales is usually made, thereby insuring a complete stock every day at all points on the route.

The store does not return to the warehouse after it leaves in the morning until the day's work is completed. The driver secures his noon-day meal at some point on his route, or brings his lunch from home in the morning.

The overhead cost of the rolling store is considerably less than it is with the average permanent local store, the former requiring but one clerk, and he will actually sell as much as two to four clerks in the ordinary store can; the selling is more evenly divided or distributed throughout the day in the traveling store, for once the customers learn that at a certain time each day the store will be at their corner, they soon adjust their buying to the schedule of the traveling store. All these facts make for slightly lower prices in the traveling store, although to judge from the reception given these stores there is no need of a price inducement to attract customers to the traveling store, as the public seems to appreciate the advantage of having the store come to the door at a given time each day, the neat, orderly way the stock is displayed and the convenience and system found in every detail.

Judging from the experience of rolling stores at other points, the venture will be a decided financial success. It is expected that a truck will pay for itself in approximately one year. The first day that the first truck was out it commenced to do a satisfactory business in a locality which had not been previously advised of the coming of the truck. It is naturally expected that it takes a week or so to work up a route, but the experience of the first truck does not demonstrate that it will require any great length of time.

New Massachusetts Law

A new law effective in September places the use of trucks on the public highways of Massachusetts in the discretion of local officials where the weight of vehicle and load exceeds 10,000 pounds.

Of 50 bills introduced the legislature passed five. After the fight on motor truck fees and a tax of one cent on gasolene ended in the defeat of these measures, the Department of Public Works centered its efforts on a bill to lower the weight limit, which now allows 28,000 pounds. A bill under consideration would have reduced this to 20,000 pounds. As the department urged a lower limit on the ground that heavy trucks were destroying the roads, especially in the spring, the compromise was granted to allow suspending heavy traffic, if necessary, at that time. The law stipulates that local officials shall determine when the trucks of 10,000 pounds or more shall be kept off the roads.

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City Finds Ash Collection Saving in One-Ton Trucks

YARD COST DOWN FROM $1.44 TO 31.3c

An interesting comparison between the cost of collecting ashes and miscellaneous rubbish with large and with small trucks is contained in a letter from Hal W. Smith, commissioner of the Department of Streets, of Evanston, a city of 37,234 people adjoining Chicago on the north. Mr. Smith's letter follows:

"I am giving you a comparison of costs of collection of ashes and miscellaneous rubbish in the city of Evanston as between the previous method of handling, namely, with 3 large trucks and 16 teams, and our present method of handling, which is with eight 1-ton trucks, equipped with Lee 4-D bodies. The figures for the former method of handling are approximate as no accurate costs were kept. However, they are based on the performance throughout last year and are very close to accurate. The figures for cost of handling with the small trucks are actual, based on the performance of the trucks since installation, which was about the first of April this year. The up-keep cost on these trucks is based on the up-keep costs of similar trucks on a similar class of work over last year, and as the trucks used last year were very old it is probable our estimated up-keep is high. However, that is a small item and will not materially affect our figures.

"Costs for last year with 3 large trucks and 16 teams:

3 trucks at a fixed charge of $8.00 per day each	$ 24.00
16 teams at a fixed charge of $5.00 per day each	80.00
19 teamsters and truck drivers @ $4.40 per day each	83.60
6 laborers @ $4.00 per day each	24.00
Total daily cost	$211.60
Average daily collection, cubic yards.	150
Average daily collection, tons	60
Average haul, miles	2.05
Average ton-miles per day	123
Average cost of collection and disposal per yard	$1.44
Average cost of haul per ton-mile	$1.72

"From the analysis of these figures it seemed impossible for the city to live within its income this year due to our increased population. Therefore we investigated closely other means of collecting and disposing of this material. After a most exhaustive investigation it was decided to purchase 8 trucks. We feel we were very fortunate in finally deciding to accept this equipment. We also believe that the figures showing cost of operation below will substantiate our contention that we have at last secured the right class of equipment for this kind of work.

"I am giving you these figures below. The equipment in this department is worked 300 days per year and in arriving at our detailed figures these 300 working days are used as the basis. As stated above these trucks are equipped with pneumatic tires all around, 33x5 rear tires, modified Lee 4-D bodies, standard inclosed cabs and speedometers, and cost as they stand $852.00 each. We are operating a fleet of eight and the figures given below are the average cost of one truck daily:

Interest, insurance and depreciation.	$ 1.36½
Tire cost	.40
Gasolene and oil	1.56
Maintenance and repairs	.60
Total fixed charges	$ 3.92½
Labor:	
1 truck driver	$4.40
1 helper for 2 trucks	2.00
	6.40
Total fixed and labor charges	$10.32½
Average number of loads per truck	11
Average number of yards per truck	33
Average number of tons per truck	13.2
Average mileage per truck	45
Average round-trip distance, miles	4.1
Average haul, miles	2.05
Average ton-miles per day	27.06
Average running time, hours	4
Average speed per hour, miles	11¼
Average idle time, hour	1
Average shoveling time, hours	3
Cost of collection and disposal per yard	$0.313
Average cost per ton-mile	$0.382

"From the above figures we are quite enthusiastic supporters of 1-ton trucks and dumping bodies for collections in this city and see no reason why they should not work advantageously in any other city of the same class and having approximately the same hauls. We expect to save this year $15,000 or $20,000 in our collection costs by switching from our old equipment to the present equipment."

Selden-Atlas Branches

The excellent building and facilities of the Hartnett-Stewart Motor Company, 1819-21 South State street, Chicago, have been taken over by the Selden Truck Corporation, Rochester, New York, and will be operated as a direct factory branch. The branch will be known as the Selden Sales & Service Company with James W. Stewart as branch manager. The Hartnett-Stewart Company has represented the Selden line in Chicago since the first of the year. The Selden Sales & Service Company will be a combination of the Atlas Truck Corporation and the Selden branches. J. Ira Hartnett will remain as Selden sales manager and Randall H. Crouse will be the Atlas sales manager.

At Philadelphia the Atlas Truck Corporation branch has been united with the Selden branch to operate as the Selden Sales & Service Company, handling both Atlas and Selden trucks. George H. Covert will remain as branch manager in charge of Selden sales; H. A. Woodruff will continue in charge of Atlas sales.

At York, Pennsylvania, the home of the Atlas truck, another branch, operated as the Selden-Atlas Sales & Service Company, has been opened at 127 South Duke Street with H. M. Heiges as manager.

The Industrial Motors Corporation, of which both the Selden and Atlas corporations are divisions, has given the sales of Atlas trucks to the Selden organization with H. T. Boulden as sales director. It is thought that this policy of combined branches will be carried out in practically all the larger cities. The branch will then sell and service both Atlas speed trucks and Selden medium and heavy-duty models. At present nine branches are in operation. The branches operating as Selden Sales & Service Company are now at New York; New Haven, Connecticut; Philadelphia; York, Pennsylvania; Cleveland; Charlotte, North Carolina; Chicago; and Tulsa, Oklahoma. The branch at Atlanta, Georgia, operates as the Selden Service Company.

Gasolene Stocks Decline Owing to Increased Use

PRODUCTION RISES TO MEET DEMAND

Gasolene stocks at refineries in the United States July 1 registered a slight decrease from the figures for the previous month, according to statistics compiled by the Bureau of Mines, which show 824,966,456 gallons on hand. This is a decline of approximately 32,000,000 gallons from the figures for June 1, reflecting the normal seasonal drop due to increased use of machines in the summer months.

Domestic consumption of gasolene for June was 507,000,000 gallons as compared with 499,000,000 gallons for May and 386,000,000 gallons for April. The May figure represents an increase of 41 per cent in consumption as compared with May a year ago, while a similar comparison for June shows a 14 per cent increase, a more nearly normal figure. Stocks for June are 10 per cent in excess of those of June a year ago.

The production of gasolene for June amounted to 525,940,600 gallons, an increase of 12,000,000 gallons over May and 51,000,000 gallons over April. Figures furnished the Bureau of Mines by refiners for the first six months of 1922 show an increase of 9.9 per cent in domestic production of gasolene, as compared with a similar period in 1921. The increase in domestic consumption is 6.1 per cent in excess of this amount or 16 per cent.

A daily average of 1,547,000 barrels of oil was run through the stills of the 310 refineries reported as operative during the month of June. These figures show a daily increase of 30,000 barrels in the amount of oils run and a decrease of five in the number of operating plants reporting as compared with the month of May. Plants reported during June were running an average of 88 per cent of their daily indicated capacity. In addition to the plants referred to above, it is estimated that there were probably ten plants of small total aggregate capacity, operating during June from whom no advices of any nature were received by the Bureau of Mines.

Imports of gasolene for June amounted to 3,986,655 gallons; exports were 52,730,889 gallons, and shipments to insular possessions were 1,872,776 gallons.

Production of kerosene for June amounted 173,649,592 gallons, a daily average increase of 181,000 gallons. Stocks of kerosene on hand July 1 amounted to 317,574,464 gallons, a decrease of 1,300,000 gallons for the month. Exports and shipments of this product were 71,500,000 gallons.

Biggest Motor User in Georgia

One hundred and six motor cars and trucks are owned by the Georgia Railway & Power Company. This is the largest fleet of motor vehicles in the state. Preston S. Arkwright, president of the company, says: "The time will come when we will be using automobiles as public transportation vehicles in territory where the business would not justify the building of rail lines."

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Producer-Gas Truck Shows 75% Saving Over Gasolene

WON FIRST PRIZE IN FRENCH TRIAL

The trials of motor trucks propelled by producer gas held in France recently were won by an English machine, a Thornycroft, which was awarded first prize. The manufacturers of the Thornycroft prize-winner have had experience with producer gas as a fuel for internal-combustion engines since 1905, when they equipped a number of small vessels with producer-gas apparatus for use with anthracite, coke, wood refuse, etc., and won a gold medal for a motor launch which showed greatest economy. The company is now producing a number of truck chassis fitted with a producer-gas plant that has been evolved as a result of seventeen years' study of the problem of providing a fuel cheaper than gasolene, and orders have been received for such vehicles for use where charcoal is cheap and gasolene dear. The problem of using corn as fuel has been completely solved.

The chassis to which this gas producing plant is fitted is of the British War Office pattern known as the "J" type, says a writer in *Motor Transport*. It has a 4-cylinder engine of 114x152 mm. bore and stroke (about 4½x6 inches) which is of standard type for gasolene consumption except that it operates with a higher compression ratio. By heat from the engine exhaust steam is produced in a separate generator not attached to the producer at all—this on the principle that the heat of the exhaust gases must necessarily be in proportion to the power developed, and thus the amount of steam can be proportioned to the working. This generator can be detached from the engine and entirely taken to pieces for cleaning, which is a point of very great importance, because whenever hard or brackish water is used a scaly deposit quickly forms on the inside surfaces of any generator and seriously interferes with its evaporative efficiency.

Again, though other makes of gas producer can be fitted to the "J" type chassis, the Thornycroft plant, being primarily intended for use with this chassis, is designed as an integral part of the machine as a whole. Consequently, every part is easily accessible, in no way interfering with the fitting of an ordinary cab or body and detracting but little from appearance; furthermore, weight can be cut down to a minimum.

One of the great difficulties in the use of producer gas for vehicle operation is due to the variable load, as, for example, when the vehicle is empty, when coasting down hill, or in traffic: particularly after being held up in traffic or after making a delivery of goods, the immediate supply of a proper quality of gas has been a trouble. But in this new design special arrangements, which are the subject of patents, have been made to overcome the difficulty, so that there shall be no need to race the engine in order to make gas production continuous at less than full power.

Finally, no water is used for the cleaning or scrubbing of the gases, and cleaning is thereby much simplified, while the possibility of corrosion or electrolytic action is eliminated.

It is claimed that the producer will work efficiently with good clean anthracite peas or good charcoal, but for light and bulky fuels like the latter a somewhat larger hopper is provided, though this is not of such very great importance, as the valve between the hopper and producer can be shut off while the latter is in operation, and the hopper can be refilled without interference with the producer or its working.

To lend itself to fitting in with the body the hopper is made of square section, the height adjustable according to the nature of the fuel that is to be employed. The producer itself is a brick or corundum lined cylinder inside a casing of the same square section as the hopper, and this, besides serving to lag the cylinder, forms a jacket for heating the air on its way to the ashpan and firebox. Through a door the fire can be easily laid or clinkered. To render all manholes and cleaning doors easily removable without the use of spanners, fastenings are effected by dogs or fly nuts.

From the producer the hot gases pass down through a water-jacketed pipe into a plain dust collector, where the larger dust particles are removed from the gas.

From the first dust collector the gases pass into a cyclone dust separator, where the smaller particles of dust are abstracted, and the gas is then passed round the chassis through cooling pipes, which are arranged with doors at the corner for cleaning purposes.

On the right side this cooling pipe leads into a dry scrubber, packed with wood, wool, horsehair, or similar material, which cleans the gases finally before they pass to the inlet pipe of the engine.

Besides cooling the gases the water-jacketed pipe produces a certain amount of steam which passes into the ashpan for gas generation, but this, of course, is not nearly sufficient to run the producer; it, however, furnishes a very useful constant supply, and the large variable addition is generated in a boiler fitted to the exhaust pipe of the engine.

As is usual with these gas producers, a hand-worked blower supplies the necessary draught for starting. This is located in a handy position so that it can be worked from the left side. Starting is a simple operation requiring no special skill and no gasolene. Generally speaking, the engine can be started on gas in less than ten minutes from cold, after which it is said that the car can be left standing with the engine idling over for an indefinite period with a certainty of starting away immediately the throttle is opened, whatever the load.

To keep the fire in condition with the engine running light, the exhauster can be easily operated by a lever within easy reach of the driver. Placed vertically over the flywheel, it is carried from the engine itself and not from the chassis frame. When this is in operation, or in starting up, the gases are blown through an outlet, which is placed at sufficient height above the cab to take the gases clear of the driver and the ordinary traffic met on the road,

The attention required by the plant itself naturally depends largely on the nature of the fuel used. If the latter is dirty or dusty, the extractor and scrubber will require more frequent attention than with cleaner fuels, but in the case of the dust extractor this only involves removal of the doors at the bottom by slacking back the large fly nuts, while the interior of the scrubber can be completely withdrawn after removal of a single fly nut, after which repacking with suitable straining material is a simple operation.

The following particulars cover running with charcoal and anthracite as fuel over a 28-mile course. These have been given as quite average figures, for the log of one of the firm's service vehicles running on anthracite for long and short journeys in country and town traffic over a distance of 1,579 miles showed a consumption of 2.6 pounds of anthracite to the mile. This anthracite was of no specially selected grade, though obviously the cleaner the anthracite and the smaller its percentage of ash, the better will be the results. In this case the fuel was of the same quality as that used in the stationary gas producers at the truck maker's factory.

Here are the details of the test mentioned above:

	Anthracite	Charcoal
Fuel	Anthracite	Charcoal
Distance	28 miles	28 miles
Time	2⅛ hours	2⅛ hours
Miles per hour	12	13.4
Pounds per mile	2.51	2 9
Water used	45 pounds	35 pounds
Gross weight	16,856 pounds	16,744 pounds
Condition of roads	Dry	Dry
Weather	Fine	Fine

On the basis of these figures, with anthracite at $15.12 a ton, a fuel cost of about 1.5 cent per vehicle-mile is shown, which, compared with a gasolene consumption of 7 miles to the gallon, works out at about a quarter of the price of gasolene.

New Atterbury Models

The Atterbury Motor Car Company announces two new models of 2½ and 3½-ton capacity. These two new models follow the 1½ and 5-ton models which have been in production for some time.

The specifications give several important changes: Latest type K4 and L4 Continental motors with pressure feed lubrication and removable cylinder heads; Delco lighting equipment with generator; semi-inclosed all-steel cabs with doors; built-in glass windshields, left hand drive and center control; amidship transmission, 4 speeds forward and 1 reverse; longer wheel bases; lower transmission gear ratios; new type hoods with removable side panels; polished aluminum radiators; combination radiator guards and bumpers; Alemite chassis lubrication systems; vacuum gasoline feed systems.

These new models along with the 1½ and 5-ton sizes, which are already in production, make the Atterbury line complete and thoroughly up-to-date An examination of the new models shows that the changes and improvements are refinements in design rather that radical and untried features intended for so-called "talking points."

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Pneumatic Truck Tire Temperatures

By F. O. ELLENWOOD
Professor, Heat Power Engineering, Cornell University

THE development of pneumatic tires has been very great and rapid, so that now we secure wonderful service if they are given half a chance in the way of proper care. It is only natural that owners of trucks should desire pneumatic tires on their vehicles used in service where speed is of considerable importance. These large tires carrying heavy loads have brought many new and perplexing difficulties to their manufacturers. One such problem is that of making a large tire that will carry heavy loads for long distances at continuously high speed in hot climates and yet have a long life for the casing and the tube. Under such conditions there has been some trouble from premature failure and yet the same casings and tubes would be very satisfactory in cool climates, thus showing clearly that the operating temperature is a vital factor in the life of a tire. The investigation described herein was therefore undertaken for the purpose of trying to do the following things:

(1) Find out the best means of measuring tire temperatures;

(2) Determine the temperature effect of inflation-pressure, load, long runs, frequency of stops, undersized rims and tire size;

(3) Determine the temperature of various designs of tire;

(4) Find some suitable means of reducing large-tire temperatures.

The experiments have all been made during the past two years at the Akron plant of the Goodyear Tire & Rubber Company and I desire to express my appreciation of the commendable policy that permits a large part of the information thus far obtained to be given to the public.

What makes a tire become hot? This question has been asked many times by laymen and often by engineers. Various answers have been given. Many laymen think it is due to the slippage between the tread and the road. This is a factor of only the very slightest importance in nearly all cases. The main reason for the rise in temperature of a tire is the generation of heat by the rapid flexing of it or in other words its hysteresis.

A tire is made up of many layers of cotton cord and rubber compound, each of which has been most carefully prepared and fitted together in a very definite and painstaking manner; then the whole mass is cured under heavy pressure at a definite temperature for a certain time. This gives a tire that is remarkable on account of its strength, wearing qualities and flexibility. Although it is probably more flexible than any other material of equal strength, it is not perfectly elastic; hence, each time a section of such a tire is bent, energy appears at that section in the form of heat. This heat is conducted to the adjacent parts, so that the tire temperature rises rapidly immediately after starting the tire, and then less rapidly to some maximum value where it remains so long as the operating conditions do not change. This maximum temperature is reached when the generation of heat is just balanced by its dissipation to the atmosphere. The first of these two factors is influenced by

(1) Amount of Flexing.
  (a) Load.
  (b) Inflation-pressure.
  (c) Size of tire (chiefly sectional diameter).
  (d) Supporting surface (flat, round, rough, smooth).
  (e) Torque.
  (f) Side-thrust.
(2) Rate of Flexing.
  (a) Speed of vehicle.
  (b) Circumference of tire.
(3) Kind of Tire.
  (a) Size.
  (b) Design (thickness in particular).
  (c) Fabric.
  (d) Compound.
  (e) Building.
  (f) Curing.
  (g) Previous use.
(4) Sunshine.
(5) Tread Slippage.

The rate at which the heat produced is dissipated is regulated by

(1) Atmospheric Conditions.
  (a) Temperature.
  (b) Wind.
  (c) Moisture.
(2) Speed.
(3) Stops.
  (a) Frequency.
  (b) Duration.
(4) Supporting Surface.
  (a) Temperature.
  (b) Material.
(5) Mounting on Vehicle.
  (a) Mud-guards.
  (b) Nearness to exhaust.
  (c) Kind of wheel.
(6) Kind of Tire.
  (a) Size.
  (b) Thickness.
  (c) Material.
  (d) Previous use.
  (e) Nature of external surface.
(7) Artificial Cooling.

Some of these factors are of only minor importance, while others are vital. Those of the utmost importance are

(1) Speed.
(2) Load.
(3) Inflation-pressure.
(4) Length of run.
(5) Kind of tire.
(6) Atmospheric temperature.
(7) Sunshine.
(8) Supporting surface.

A glance at these factors will indicate that it is not always easy to answer the common question. How hot does a tire become? Furthermore, a little consideration given to the question, How is the best way to determine this temperature? will show that this is a matter that can not be answered easily. A search of the scientific literature yielded almost no information concerning the temperatures attained by pneumatic tires or the methods of measuring these temperatures. It was therefore necessary to develop methods of making such measurements.

Before making any comparative temperature-tests it was necessary to determine the deflection of various sizes of tire when resting on the curved surface of the testing machine. By deflection of a tire we mean the vertical drop of any part of the wheel on which the tire is mounted as a result of applying a known load to the tire. This deflection causes the lower part of the tire to flatten until the contact area becomes sufficiently large to support the load with the air pressure existing in the tire.

For the runs that were made on the 40x8 inch tires the testing machine was not strong enough to permit full load, so the full-load deflection was obtained by reducing the inflation-pressure. This undoubtedly reduces the tire temperature below what it would be for full load and full inflation-pressure. Just what this relation may be for various sizes of tires is a matter that is still being investigated.

The temperature rises rapidly during the first 60 miles, then less rapidly to its maximum, which is near 150 miles, for an 8-inch tire when running at 30 miles per hour. The smaller the tire the sooner it reaches its maximum temperature. The use of an undersized rim on a 40x8-inch tire is a practice not to be incouraged in general, and one to be distinctly avoided in hot climates. The temperature of this size of tire rises very rapidly with decreasing inflation-pressures. For the load of 2,500 pounds the lowest pressure, 38 pounds per square inch, represents a deflection nearly 60 per cent. more than normal. This is what many tires sometimes have to endure.

The reason for the inside couple near the center of the tube giving values lower than those obtained from the pressure and the volume is probably largely due to heat conduction from the type of couple used and to the convection currents. These readings from the inside couples were all obtained while the tire was running, except those taken after 5½ hours of the test when the tire was stopped. Attention is called to the very rapid drop in tempera-

[Read before the Society of Automotive Engineers.—ED.]

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ture of the eighth ply and of the cushion in the tire immediately after stopping, at the end of 150 miles. This is a 12-ply tire with a thick tread. This test shows, as did many other similar to it, that the air in the tube is some 15 or 20 degrees cooler than parts of the casing. It also shows how quickly the high temperatures are reached by those parts of the tire in which the heat is produced, so that long distances do not need to be covered to produce temperatures that may be injurious to the carcass.

For those sections of the country where there are long periods of very hot weather it is undoubtedly true that some simple means of keeping large truck tires cooler than they are under present conditions would be very valuable. It was therefore one of the purposes of these experiments to ascertain if possible some means of doing this. The most successful method of artificial cooling investigated was that in which a small quantity of water is placed inside the tube before inflating it with air. Many such experiments, beginning in 1919, have been run and in all cases the reduction of the average tire temperature by water has been very noticeable. The hotter the tire the greater this effect, for reasons that will be discussed later.

The theory which prompted trying water inside the tube is this. First, we should expect a certain reduction of heat generation because of the reduced flexure of the casing by reason of the increased pressure inside of the tube due to the pressure of the water vapor. This vapor-pressure would be small, but nevertheless would act as a sort of safety-valve in under inflated tires because the hotter the tire the greater would be such pressure. The vapor pressure rises faster than the air pressure for a given increment of temperature.

In the second place we should expect that the vapor inside the tube would transfer a large amount of heat from the hot portions of the tube to the cooler parts of it, since as the tire rotates the water is kept in a thin band extending entirely around the tread portion of the tube. That portion of the tube covered by the water is the hottest. The water absorbs heat from the hot part of the tube and the vapor thus formed carries a large amount of heat from this part of the tube to the cooler portions lying next the rim and sidewalls on which condensation takes place. There is a very rapid circulation of the air and vapor in all transverse sections of the tube, due to the difference in temperature between the thread and bead sections of the tire. The faster the tire rotates the more rapid is this circulation. Thus it is easy to conceive of an extremely rapid circulation in every transverse section of a rapidly rotating tire whether it has vapor in it or not. The addition of water-vapor produces more rapid circulation as it increases the difference in densities for equal temperature differences. It is, however, in the vastly superior heat-carrying capacity of a wet vapor, as compared with dry air, that we should expect to find the main advantage of the vapor. The delivery of more heat to the cooler parts of the tube lying next the rim and sidewalls means increasing the ability of the tire to dissipate heat to the atmosphere. If this be true, we should find a very marked decrease in the temperature of the hottest parts of the tube, which always fail first, and an increase in the temperature of the coolest parts of the tube, which never fail from high temperature. The average tube temperature should also be lowered in proportion as the ability of the tire to dissipate its heat is increased. This would be best determined by the temperature of the air in the tube, as the average temperature of the tire can not be so nearly measured by any other means.

In the third place we should expect a cooling effect by reason of the absorption of heat by the liquid itself, until this liquid becomes heated up to the same temperature as the tube. Here we should expect a cooling effect that would depend upon the amount of liquid used and the distance run without stopping. On the other hand, the effect of the vapor will be independent of the amount of liquid used. The experimental evidence will now be presented to substantiate this theory.

The cooling effect of water inside the tube of a 40x8-inch tire in amounts varying from 5 to 25 per cent. of the air volume of the tube or from about ¾ to 3½ gallons of water has been recorded. The larger amounts are advantageous only during the first few hours of the run, as the temperatures with water in the tube all finally approach the same value. This wet-tube temperature is very appreciably lower than when using the dry tube. For each tire the total pressure is slightly greater with the dry tube until about 30 miles have been run. From that point on the temperature has become high enough so that the vapor pressure more than compensates for the lower air pressure in the wet tube due to its lower temperature. The wet tubes are about 30 degrees cooler than the dry ones after 90 miles have been run. At 30 miles this difference is about 25 degrees. With these tires badly underflated one of the dry tubes reaches a temperature above that of the room of 147 degrees fahrenheit and the other one goes to 134 degrees. This difference is due to the variation in the design of the two casings. With 9 per cent. of water in each of these tubes in the same casings as before we have the tube temperatures reduced more than 30 degrees. The cooling due to the vapor pressure is about one-fourth of the total cooling effect, showing that the vapor must be given the credit for most of the benefit derived from the water in the tube.

The tire thermometers always gave temperatures much lower than those obtained by calculation from the pressure and volume measurements. With water in the tubes the tire thermometers would for many tests give higher readings than with the dry tubes. I believed that this was because the vapor caused a greater reduction in the correction of the tire thermometer than it caused in the reduction of the temperature of the tube. With wet vapor surrounding the thermometer well instead of dry air the amount of heat delivered to it would be much greater; hence we should expect a large reduction in the correction of the instrument. This made it imperative to check very carefully the amount of moisture in the air when we were supposed to be using dry air.

Even for a 36x6-inch tire the cooling effect of the water is very marked, but is not as great as with the 8-inch tire. The temperature increases rapidly with the size of tire chiefly due to the increase in the thickness of the walls of the casing as the size increases. It is obvious from that ordinarily no artificial cooling is needed for tires 6 inches or less in diameter, but as we go to 8 inches, and above, anything that will keep the tire cooler should be used if it is not troublesome in its application. Putting a small amount of water inside a tube is a simple matter and there is nothing further to do about it until the tire is to be used in freezing climates, when the tube should be taken out and drained. There is no change in the riding qualities of the tire by using a small amount of water. There appears to be no objection to its use and the certainty of its cooling effect on the tube makes it deserving of a trial by all truck owners who operate large pneumatic tires at high speed over long distances in hot climates.

From these experiments it may be deduced that:

(a) The measurement of the increase in the air pressure of a tire is a very accurate and reliable means of determining the average tube temperature, provided proper precautions are taken to know whether the air is saturated and to have accurate measurements of pressure, volume changes, leakage and initial temperature.

(b) Convection currents inside the hot tube are very large and may produce a large correction to any temperature-measuring apparatus that records only the particular temperature at some definite region, which is small in comparison with the whole cross-sectional area of the tube.

(c) These convection currents are due to the variation in density of the air in contact with the hot and cool portions of the tube, combined with the force of gravity and that due to the rotation of the wheel. The first of these forces causes the convection currents to flow in the longitudinal direction of the tube when the tire is standing still, and the second causes much stronger currents in a transverse section of the tube when running.

(d) The temperature of a tire increases very rapidly with its size due to the thickness of its walls.

(e) High temperatures are destructive to tires, but the relation between the life of a tire and its temperature for various compounds has not yet been established.

(f) Small amounts of water, from 5 to 10 per cent. of the air volume, used in the tube with the air result in a cooler tire, the difference in the temperature being marked in the case of a large hot truck tire.

(g) The use of water in tires of passenger-car size is not recommended, since their temperatures are not usually sufficiently high to justify it.

(h) Care must be exercised when using water in the tube to drain the water from it before exposing it to temperatures much below the freezing-point.

(i) All users of tires should note the rapid increase in tire temperature with the decreased inflation-pressure, so that they may prolong the life of their tires.

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In conclusion, I desire to express the opinion that the study of pneumatic tire temperatures is of much greater commercial importance and possibly of more scientific interest than is generally realized. A quick temperature test of a tire may yield much more information than a long expensive test to destruction of the same tire. A temperature test is not, however, complete in itself for all tire testing, since tread wear, for example, requires another type of test, which, incidentally, can also probably be made better in the laboratory than on the road. Even after the correct temperatures of a tire shall have been determined, there is much research work yet to be done in order that the full significance of such information may be appreciated. This much, however, is sure: the rise in temperature of a tire is a direct and sensitive indication of the waste of energy due to its operation. The greater this loss of energy the faster the tire wears itself out and the more power is wasted to operate it. This loss can never be reduced to zero, but it can be kept low by selecting the most suitable materials and then very skilfully combining them according to the best design.

Effect on Quality

(*Continued from page* 11.)

quality of the truck. Quality means economy here because the best quality truck uses less gasolene and oil, its power enables it to keep out of low gear, it depreciates more slowly and a longer life means less of its first cost to write off each year; it costs less for repairs. Besides the possibility of reducing the allowance for repairs, there are also the much bigger expenditures for hiring substitutes which the quality truck avoids, or the loss of valuable business when the truck is laid up.

"Seventeen cents only of each dollar spent can be affected by the purchase price.

Depreciation	12 cents
Interest	4 cents
Fire and theft insurance	1 cent

"The yearly depreciation figure is found by dividing the price by the life of the truck. Therefore, while the high price tends to raise this item, a long life will lower it. Even if a cheaper truck lasted as long as a better built, better quality truck, each $300 reduction in price would save only 1 cent in every dollar of operating cost. But if the cheaper truck does not last as long as the better quality truck, there can be no saving. Real truck economy is in low operating cost—not in the purchase price.

"Slow depreciation, minimum repair bills and lost time are essential to low cost operation of trucks. They are the big items. Keep your eye on these facts and the purchase price will take care of itself.

"Of the dollar you spend for truck operation: 39% is for fixed items, the same for every truck. 44% is in the hands of your driver. The quality of your truck governs his work. 46% is spent for operation costs which the quality of your truck controls. Only 17% of operating expenses are influenced by the purchase price. The truck that lasts the longest is the least expensive."

Motor Coach Will Stimulate Cry for Good 'Buses

By GEORGE A. KISSEL

President, Kissel Motor Car Company

AFTER an investigation of the motor 'bus lines operating in different sections of the country and a comparison of the results with those factors that created the necessity for this means of transportation, such as congested city traffic, inadequate street-railway facilities and railroad equipment, one can not help being impressed with the fact that the motor 'bus as a passenger transportation unit has hardly touched the surface in the field of passenger transportation. I understand that quite a proportion of leading centers have outgrown or are outgrowing local transportation facilities. The automobile has made this up to a great extent but the automobile is limited as to passenger capacity while in most cases a conveyance or vehicle designed to carry a number of passengers on a prescribed route or schedule is what is needed.

Not only is this lack of transportation felt severely in leading cities, but also between centers and even between states, and it would seem that these needs must be filled by other carriers than a street-railway and railroad because this condition has existed for several years and as yet no concerted action has been taken by the public carriers to eliminate it. Thus was created the necessity for a transportation unit that could step right into place and begin operating without waiting for the construction of right-of-way and without confining its operation to a prescribed route.

A survey throughout the country will show that practically all populous centers, as well as small cities and even small towns, are either connected by motor 'bus routes or are equipped with them for intraurban service, and each year has seen an increased patronage by the public. Indeed this increase has been so consistent that motor 'bus companies have built up properties in the way of service stations, passenger depots, waiting rooms, etc., that are the equal of those of many railroads. This public acceptance, which was remarkable at the very start of the motor 'bus entrance as a public utility, is indicative of the business that can be built up if carriers are provided that are comfortable, attractive, safe and speedy.

We can all remember the first 'buses that were built with a truck chassis and motor, and a body built high up, decidedly awkward in appearance, uncomfortable for passengers and uncontrollable by the driver. From such first attempts 'bus manufacturers have been gradually making improvements both mechanically and in body designs. From employing a light truck chassis they have through successive stages lowered both chassis and body to eliminate the awkward top-heavy design and have created a more comfortable riding vehicle. Attention was also given to the construction of more comfortable seats, because it was soon found that there is nothing more tedious than even a short ride in a heavy conveyance. To-day in some sections of the country the 'buses are just as comfortable and attractive and up-to-date as are railroad parlor-cars. Especially is this true in those scenic sections where railroad facilities are not as plentiful as they are in other districts and where overland transportation Manufacturers and their engineers have must be depended upon to a great extent. solved the motor 'bus problem by building the body low over the chassis and providing sufficient live weight to absorb, with proper weight and balance, the irregularities of the road, and by padding and upholstering the seats have been made very comfortable. Without going into detail concerning 'buses of this character I have often wondered whether it was really necessary to design and build such a heavy vehicle in order to attain maximum riding comfort and roadability.

The result of all of our investigations along these lines we boiled down to the essential factors around which we built the new Kissel coach for urban use and which are as follows (1) Parlor-car comfort, (2) perfect roadability, (3) safety features, (4) ease of traffic control, (5) proper speed, (6) operating and maintenance economy. Every one of these items is found in the automobile of to-day, especially in the limousine or sedan type, and we felt that, if we could build a sedan along the lines of a coach but accommodating 18 passengers, we would produce a practical 'bus design. We felt that we would be giving the public touring pleasure with sedan comfort, and that the public would be quick to appreciate the advantages of such de luxe accommodations and would be perfectly willing to pay the increased cost.

Investigation among leading 'bus owners brought forth the fact that the public was perfectly willing to pay for de luxe travel on runs over 25 miles. In that case we believe that motor 'bus operating companies as a whole will find it profitable to add to their present fleet a sufficient number of de luxe units for operation on a regular urban schedule but at a higher cost to the public. In other words they would be offering the public parlor-car accommodations. While the bulk of the traveling public prefers the day coach, there is a big proportion of the public that is willing to pay a slight increase in cost to secure the ease and relaxation as well as pleasure and satisfaction of the parlor-car. It is also estimated that the use of such vehicles would quickly create a desire on the part of the public for first-class motor 'bus accommodations, which in itself will do a great deal to make the motor 'bus not only a recognized means of public transportation, but also what is still more important, a permanent public utility.

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Experience with Electric Trucks in Glasgow's Municipal Service

By R. B. MITCHELL

Engineer and Manager, Glasgow Corporation Electricity Department

THE road surfaces in Glasgow are mainly cobbled, and there are many stiff hills, so that the conditions can not be considered favorable for economical trucking. The nature of the work on which the city's motor vehicles are engaged is very varied, and comprises general cartage for the various sections of the Electricity Department, ash disposal from the power stations, and cable haulage. The diversity of machines and duties has provided very valuable experience on all aspects of electric vehicle running.

It is quite realized that the scope of the battery vehicle lies in the sphere of action intermediate between that of horse haulage and gasolene or steam haulage, and that comparisons are somewhat difficult to make. To provide a standard of comparison, the cost sheets, issued by what is undoubtedly one of the best gasolene vehicle firms, are taken as a basis. The items in this cost sheet are examined individually, and compared with similar figures for an electric vehicle of corresponding standing. The running conditions for city work are then reviewed to find which of the types is the more suitable under the prevailing conditions.

It is clear that many of the parts in both machines operate under practically identical conditions. For example, the mechanical parts, such as wheels, steering-gear, brakes, chassis, and body. The real point of divergence comes when the battery motor and transmission gear of the electric vehicle are compared with the gasolene storage and feed system, motor, clutch, and gear-box of the rival type.

The table shows a cost comparison between gasolene and electric vehicles of 1-ton capacity.

	Gasolene.	Electric.
Miles per year	8,000	8,000
Initial cost	$3,900	$4,500
Annual Cost.		
Tires	$ 140	$ 100
Interest	235	270
Depreciation (gasolene 15%, electric 10%)	585	450
Renewals (battery excluded in case of electric)	250	50
Driver	910	910
Oils and grease	55	5
Insurance	115	75
Gasolene (10 miles per gallon, 48 cents per gallon)	400	...
Electrical energy	...	175
Battery renewals	...	400
Tax	525	125
Total annual cost	$2,805	$2,460

It will be seen from the table that there is very little to choose between two types of machines on the above basis, and on work with even moderately long, straight runs, where the speed of the gasolene truck can be taken advantage of, there is no case whatever for the battery vehicle. When, however, the running is of an intermittent nature, such as prevails in city work, the fuel consumption of the gasolene driven vehicle increases enormously, and it is common experience that 4 or 5 miles per gallon is more often obtained than the 10 mile per gallon allowed for in the above schedule. It is, of course, possible that gasolene vehicle engineers could design machines especially for such work, and it is rumored that one prominent firm has already produced a machine with the special characteristics in order to face the competition of electric vehicles in this many-shop service.

It is proposed here to give some figures of results attained in Glasgow with electrical vehicles of different types. The electric vehicle is used in Glasgow for—

(*a*) General cartage and ash disposal in the Electricity Department (21 machines).

(*b*) Refuse collection in Cleansing Department (22 machines).

(*c*) Ash disposal in Tramways Department (2 machines).

In addition to these 3 privately-owned machines are garaged in the service station of the Electricity Department, and four Glasgow firms have private charging-stations of their own.

Practically every type of electric vehicle procurable in Britain is represented, and while this has had a serious effect on the costs, the heterogeneous nature of the fleets may be justified by the fact that the electric battery car is at a very early stage of its development in Great Britain. It is also essential for an electricity department to investigate the working of all types.

The types of cars used in Glasgow may be divided, roughly, as follows: American single motor cars with chain transmission, American single motor cars with balanced drive totally inclosed, English single motor cars with chain transmission, and English 2- and 4-motor cars with gear transmission.

The early American cars bought in 1912-1915 were exceedingly satisfactory in most respects, the mechanical design, however, left much to be desired. Accordingly, the costs and maintenance of the chassis, brakes, steering-gear, and body were excessive.

The English-built cars, with one or two exceptions, were sound mechanically, but the electric parts gave an immense amount of trouble as compared with the American machines, the batteries, controllers, and motors being all definitely inferior to those of their American rivals. Other English efforts were so bad, both mechanically and electrically, that they must have done an immense amount of harm to the battery vehicle industry generally, since very few people will take the trouble to investigate the causes of the car break-downs, and to differentiate between troubles which are inherent in the type and those which are confined to individual designs. These points are brought out clearly in the second table, which shows the total costs in cents per mile of replacement parts for the whole fleet of cars used by the Electricity Department in Glasgow. The time spent on these replacements is not included, because that is a function of the efficiency of the garage staff, and also of the diversity of types of cars which are employed.

Description of Vehicle.	Age in Years. (approx.)	Chassis and Body.	Battery.	Motors and Connections.	Tires.
1 -ton van	10	3.120	0.416	0.030	0.550
½-ton truck	7	4.214	6.092	0.028	1.156
1½-ton truck	7	3.402	0.320	0.028	1.268
3 -ton truck	7	7.714	0.826	0.094	2.178
5 -ton ash wagon	6	10.990	8.572	0.254	3.968
5 -ton ash wagon	6	6.402	0.842	0.136	4.770
2 -ton ash wagon	4	3.226	0.318	0.400	2.002
2 -ton ash wagon	3	3.236	0.904	1.914	0.324
5 -ton ash wagon	3	6.430	0.884	0.396	5.158
5 -ton ash wagon	3	3.154	9.086	0.174	1.250
2½-ton dump truck	3	6.486	5.812	0.296	.....
1 -ton van	3	0.388	0.048	0.058	.....
10 -ton tractor.	2	1.056	0.078	0.076	.....
5 -ton dump truck	2	1.886	7.346	0.278	.....
Tricar	2	.....	.....	.....	.....
2 -ton truck	2	0.92	0.210	0.10	.....
2 -ton truck	2	0.98	.....	3.142	0.118
Brougham	1	2.638	.....	3.222	3.082
2 -ton truck	1	0.164	.....	3.312	.....
2 -ton dump truck	1	0.814	0.008	4.148	.....

The most important deduction to be made from this table is the enormous preponderance of mechanical replacement costs as compared with electrical ones, even including the battery. This shows that a properly designed and built electric battery vehicle could be operated over a very long period at a low cost, and that when the average electric battery vehicle attains the perfection of mechanical design reached in gasolene truck practice it is almost inevitable that the use of such machines will be much more general than at present.

Many prominent transport users in Glasgow are at present replacing gasolene by horse haulage, and this is a sure indication that they consider the latter to be the more economical. It is, therefore, of interest to consider the relative merits of the battery vehicle as compared with horse-drawn vehicles.

The superintendent of Glasgow Corporation Cleansing Department has stated definitely that he is not convinced that mechanical transport is superior to horse transport, and as his experience is very wide, and includes work with gasolene and steam cars, as well as electric vehicles and horses, his opinion must be taken very seriously. It is worthy of note, however, that Glasgow alone of all the towns considered gave an adverse opinion on the electric vehicle. In the opinion of the writer there is every possibility that Glasgow will be able to give a very much more favorable report in the near future. The reasons for the present position are:

(1) The horse transport in Glasgow Corporation is very well established, and gives very good results, when compared with that of other towns.

(2) Conditions in many parts of the city are very much against any form of mechanical transport. (Refuse has to be collected from narrow lanes, where the surfaces are exceedingly uneven.)

(3) The cost of running the electric vehicles has been very seriously increased within recent years, due to a large proportion of the vehicles purchased having proved of faulty design and construction.

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(4) Battery costs have proved higher than was expected, owing to some of the batteries having failed to fulfil their guarantee. In justice to the battery makers it must, however, be stated that these failures had quite rational explanations, and are not likely to recur.

(5) The majority of the troubles which have occurred have been mechanical, and with the exception of one make the electrical equipment has been very satisfactory.

The result of the trouble which has been experienced is that Glasgow Corporation Cleansing Department can only credit each of its electric vehicles with replacing 1½ horses and carts, and this is insufficient to justify electric traction in this case.

The Glasgow Electricity Department owns electric vehicles only, and when horses are required they must be hired from contractors. The present contract rates for cartage and running costs of electric vehicles are such that one electric vehicle must do the work of 3 horse vehicles in order to justify its existence. Much can be done to improve the running costs of the electric vehicles, but each must be capable of doing the work of at least 2 horse-drawn vehicles, even when electric vehicle costs have been reduced to the lowest possible point. A careful inspection of the records of work done by horses operated by contractors has shown that the best result obtained has been 20 miles per day. The average load in this case was ½ ton. A 2-ton electric vehicle has done 47 miles in one day with a load of 1-ton. This is, however, an exceptional performance, and 40 miles per day would be a fairer basis of comparison. This gives a 4 to 1 ratio (40 ton-miles to 10 ton-miles) in favor of the electric, so that there should be little difficulty in obtaining the 3 to 1 ratio which is economically necessary. It is, of course, realized that the nature of the work to be done is all-important in comparisons of this kind, and that each case must be examined separately.

The nature of the work of the vehicles used by the Electricity Department makes it very difficult to get figures of the loads carried, and at present the following statistics are kept:

(1) Total energy input to the batteries per mile.
(2) Ampere-hour output per mile.
(3) Mileage run.
(4) Hours available.
(5) Hours in use.

Standard battery sizes, as recommended by the vehicle makers, have been used so far, but it has been found that much better results could be obtained by the use of larger capacities. This is particularly the case in winter, when the demand on the batteries is often abnormal.

The ampere-hour meters installed on all machines have been fairly satisfactory, but they must be overhauled about once a year. This is rather a serious item on the cost sheet, and it is doubtful whether these instruments will be used on future vehicles.

Some users claim practically perfect reliability for their electric vehicles, but Glasgow experience has not been so fortunate. The best types of car have been available for six days per week for two years on end, and one week is amply sufficient for an overhaul which will enable them to go on for a similar period. Sudden breakdowns are now almost unknown, except as the result of accidents, and most of the cars are very free from need of adjustments. The need for overhaul is brought about solely by the inevitable wear on the moving parts.

The guarantees issued by battery firms are not comparable with those given to ordinary machinery, as there is no possibility of the guarantee periods of use being greatly exceeded. This point, although quite obvious to anyone who has given real attention to the principles of storage batteries, is, unfortunately, not realized by many users of electric vehicles. The present custom with lead batteries is to guarantee for a period of two years with a capacity of 80 per cent. of the initial value at the end of the period. The best result attained in Glasgow has been a total life of three years. The nature of the load on the battery is a very potent factor in determining its life, and it is a matter of the utmost importance that this load should not be excessive. The practice sometimes adopted of fitting a small battery, and giving it "boosting" charges, is one which is far from satisfactory in most respects. The question of battery rating deserves close study, and, in the first instance, I should recommend that a guarantee of the number of cycles of charge and discharge should be given in all batteries, in addition to the ordinary duration guarantee.

The figure of 6.90 cents per mile for battery renewals, given in the first table, although very much in excess of some of the figures quoted in the second table, can not readily be reduced, and it lies with the battery makers to devise something more economical.

Axles, steering-gear, brakes, chassis members, etc., should follow good gasolene truck practice, as gasolene vehicle designers have obviously very wide experience, which should not be neglected.

Much controvery has raged over the subject of single-motor *versus* multi-motor vehicles. Most of the electrical troubles experienced in Glasgow have been with the latter type. It must, however, be admitted that recent results with cars of this class have been entirely satisfactory, so that the writer can not join in the wholesale condemnation of the type which is commonly indulged in. Most published matter on the subject is either "inspired," or is not based on really thorough tests, and users should endeavor to find out accurately whether the extra complication of the former type is justified by the higher efficiency claimed for it. The best types of motors are so satisfactory that they require practically no attention. The only improvement which can be looked for in this direction is some very slight increase in efficiency, and possibly the introduction of regenerative braking. Combined gear-and-chain transmission systems have given very good results, but by far the most satisfactory of all has been the balanced drive with one motor and totally inclosed gears.

The only item of the electrical equipment which gives rise to any appreciable trouble is the controller. The plain drum type has proved most satisfactory so far, but there is still scope for improvement, even in the best types covered by Glasgow experience.

British Imports

During June the imports of automotive products into Great Britain amounted to $4,472,650 as compared with $3,164,985 in June of 1921 and $15,194,070 in the same month of 1920. The itemized figures follow:

	1922.	1921.	1920.
Trucks	$ 106,285	$ 175,230	$2,156,390
Cars	914,335	651,125	4,211,310
Chassis	643,560	518,005	2,321,935
Parts	659,350	676,620	4,003,235
Tires and tubes	2,149,120	1,144,005	2,501,100
Totals	$4,472,650	$3,164,985	$15,194,070

Republic 'Buses for Baltimore

The Baltimore Transit Company has just opened two new 'bus lines over its Charles street and Druid Hill Park routes. Sixteen Republic Knight-motored 'busses of the single-deck type have begun operation over the Charles street route, and 10 have been assigned to the Druid Hill Park route, with termini at Camden Station and Eutaw place. The 'busses will operate on a 6-minute schedule except during rush hours, when a 5-minute headway will be maintained.

The choice of 'bus equipment for these two important lines is the outgrowth of tests which were begun by the Baltimore Transit Company in October, 1921. At that time, a single 'bus of the type now in use was placed in operation on Charles street, and for 7½ months, until June 1 of this year, every detail of its performance was carefully observed by officials of the company. During the test period, the 'bus under observation traveled more than 35,000 miles and carried 157,143 passengers. The average fuel consumption was 9 miles per gallon, and the cost of repairs, including labor and material, was less than $100.

First among the essentials demanded by the company were those factors which make for perfect safety and comfort of passengers, and second, economy of operation and adequate insurance against interrupted performance.

Each of the new 'busses has a seating capacity of 24 passengers. The seating arrangement has been carefully worked out to provide the maximum of comfort, as well as convenience in entering and leaving the 'bus. The driver has excellent vision in all directions, due to the use of a specially designed windshield and semicircular windows in the front vestibule. At night the 'busses will be illuminated by means of eight dome lights.

Farmers Favor All-Purpose Body

The American farmer is practicing economies in solving his transportation problems, as proved by figures compiled by the statistical department of the Republic Truck Sales Corporation at Alma, Michigan. Thirty-three per cent. of the farmers interviewed in a recent questionnaire sent out by the company expressed their preference for the all-purpose farm body type of truck as the one best suited for their general needs on the farm. Twenty-five per cent. expressed a preference for the box type of body, 22 per cent for the express type and 20 per cent. for the rack type of body.

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Hauling Chickens at Less Than One Per Cent. of Value

By JOSEPH ROTH

Elizabeth, New Jersey

OUR entire poultry business, amounting to $400,000 a year, has been built up on the dependability of motor trucks. We do both a wholesale and a retail business, and sell all our poultry over the counter in our store. Our whole stock has to be hauled from the railroad yards and Hoboken ferries, 16 miles away.

In November, 1915, I bought a truck and used it steadily for 2½ years. The repair charges were almost nothing, and the truck proved very satisfactory in every way. Then I decided to turn it in and get a larger truck; my business had grown so that I bought a 5-ton Selden. After driving this second truck for 2 years, I traded it in toward another 5-tonner in May, 1920.

This machine has been operating steadily for the past 8 months, making 4 trips a week to the Hoboken ferries and bringing back 30 to 38 crates of poultry. The crates average about 270 pounds, including contents. The crate itself weighs 80 pounds, and the poultry 190 pounds. There are from 34 to 40 chickens to the crate.

The truck starts about 8 o'clock in the morning and makes the run to Hoboken in an hour and a half. Loading at the docks and freight houses is a slow process, but the truck usually gets back long before dark. We run it only 4 days a week, but have work in the store to keep the driver busy the other two days, so we don't charge his full time against the truck.

Our truck is costing $16.74 a day, 50.93 cents per mile, $3.54 per ton, and 22.18 cents per ton-mile. Figuring the cost by the crate, it amounts to 47.77 cents per crate and 3 cents per crate mile.

Of course the price of chickens varies considerably from time to time, but taking an average of 30 cents a pound the average value of a load of chickens is $1,938. The cost of hauling this load to our store is only $16.74, considerably less than 1 per cent. of the value of the chickens. This amounts to about one-quarter of a cent per pound, a cost which is negligible. The truck is hauling $7,752 worth of poultry per week, or $403,104 worth per year. In the eight months it has been operating, it has hauled a total of approximately 175,000 chickens.

To get our poultry here as needed, we must have a dependable truck. Neither of our first two trucks cost us much of anything for repairs, and so far we have not spent a cent on the new one. We can not credit this entirely to the truck, because we look it over pretty thoroughly every morning before starting out, and drive carefully.

A summary of our records of cost and operation follows:

Operation.

Days operated	139
Round trips	139
Crates hauled	4,726
Tons hauled	638
Miles traveled	4,432
Gallons of gasolene	887
Gallons of oil	55
Round trips daily	1
Crates hauled daily	34
Tons hauled daily	4.6
Miles traveled daily	32
Ton-miles daily	73.3
Miles per gallon gasolene	5
Miles per gallon oil	80.6

Cost.

Investment	$4,825.00
Interest on investment	168.88
Insurance	225.00
Taxes and license	91.00
Garage expense	100.00
Fixed charges, year	584.88
Fixed charges, period	389.92
Variable charges	1,056.63
Driver's wages	810.83
Cost for period	2,257.38
Fuel	274.97
Oil	24.20
Tires	132.10
Depreciation	492.03
Maintenance	133.33
Variable expense	1,056.63
Cost per day	16.24
Cost per crate	.49
Cost per ton-mile	.23

'Buses Have No Rights in Iowa

Iowa has no motor legislation specifying rights of motor bus companies or determining the extent of competition permissible or differentiating motor busses from ordinary highway traffic, Judge George W. Wood said in dissolving the temporary injunction of the Motor Bus Company against two competing lines, the Johnson Motor Bus and the Red Ball Transportation companies.

The plaintiff company had charged that its competitors after its service was established and a clientele secured, had engaged in unfair competition, scheduling its Waterloo-Cedar Rapids trips just ahead of the original company; had used signal lights similar to the Motor Bus to further a plan to procure the plaintiff's business and resorted to using similar colors and cars in its business. The court found that these acts were not sufficient basis for an injunction and that there is no code giving any bus company right to bar any other bus from use of the highway. Their rights of the road do not differ from those of any other vehicle passing or repassing, the court said. The temporary injunction that had been issued was set aside.

Truck Saves $3,000 Yearly on Short Depot Hauls

By A. N. PHILLIPS

President, Central Ohio Supply Company, Columbus, Ohio

WE operate a fleet of 23 regular motor trucks in addition to some light delivery cars. Seventeen of these trucks are used for delivering groceries to our retail stores, of which we operate 60 to 70 in Buffalo, and a great many in the surrounding towns. The goods come in by rail and are distributed by these 17 trucks, which range in capacity from 1½-ton to 3½-ton. The city stores are covered Mondays, Tuesdays, Thursdays and Fridays, and the out-of-town stores every day except Saturdays, which are reserved for miscellaneous deliveries.

The 5-ton Selden truck which we put on this work in June, 1920, is equipped with a covered stake body. It delivers all kinds of groceries, such as flour, sugar, fruit, vegetables, canned goods, etc., which are packed in barrels, crates, or paper boxes. It also brings back the empties.

The truck usually starts out at 7:30 in the morning. If going on a very long trip, it is loaded the night before. In the first 6 months of 1921 it made 319 trips, averaging slightly over 2 a day. However, one extra long trip might easily take the entire day. Trips are often made to Dunkirk, 50 miles away, Cattaraugus, 40 miles, and Brockport, 85 miles. The stops average slightly less than 2 per trip, the truck having made 550 delivery stops in 319 trips.

We don't believe in overloading or overspeeding. Our trucks are held down to 16 miles an hour and the loads do not average over 3½-tons. To facilitate handling the larger number of packages hauled, the truck carries a helper.

We figure that 5 years' life for the truck is quite conservative. Repairs and maintenance are possibly somewhat high with us, because in the grocery business it is important that our trucks should look neat and clean at all times. We paint them every year and a half, and wash them regularly once or twice a week. This is hard on the paint and accounts for the high painting cost. All our trucks are painted green, which is also the standard color for the fronts of our stores.

We do all our repair work, but call on the truck manufacturers for parts. During the first 6 months of 1921 the Selden cost us $51.80 for parts, $68.75 for labor, $110.32 for washing, alcohol, grease, sponges, soap and miscellaneous supplies, the total being $230.87. Our superintendent estimates that $600.00 a year will easily cover repairs and maintenance on this truck.

The total operating cost is $15.97 a day with driver and helper, which amounts to 53.13 cents per mile, $2.1035 per ton, and 30.38 cents per ton-mile. Deducting the labor charge, the cost per day is $9.13.

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Rails *vs.* Motors in California

By JOHN T. COULTER

THE railroads and real estate organizations in California are fairly well united in an effort to put a definite and permanent check on the development and operation of motor 'bus and motor trucking lines in that state, and matters have already reached the stage where union labor has lent its aid in the work to the extent of boycotting merchants who patronize motor carriers. The interests represented in this attack on motor traffic, when taken in connection with the opposition to heavy motor trucks which exists in the state and county highway departments, are very formidable and their antagonism is not to be regarded without concern.

It is not to be supposed, however, that the methods adopted by this powerful group are not being combatted by those interested in the further growth of motor transport, although it should be admitted that great pressure must be exerted to offset the damage already done and the capacity for mischief that resides in the railroad and legislative groups. Automotive dealers have agreed to accept no shipments delivered over the railroad which is most conspicuous in the fight—the Southern Pacific—and the loss of freight revenue through this form of retaliation may reach the sum of $10,000,000, which is the approximate total of motor vehicle freight charges in the state during the year. This action was taken by the Motor Car Dealers' Association of San Francisco, which includes in its membership most of the truck dealers in the northern part of the state and, as a result, the general manager of the Southern Pacific's operation and maintenance departments informed all division superintendents that the road would not allow itself to be made a party to the boycotting activities of such of its employees as belonged to the Southern Pacific Good Service League. This body was organized in San Francisco with one of its expressed objects being "to assist in combatting unfair competition, such as auto truck and 'bus lines operating in territory served by our lines." The league addressed a petition to chambers of commerce and other business organizations throughout the state and embodied in its plea the following statement:

"The league is an organization of Southern Pacific employees in San Francisco numbering approximately 6,200 persons, and it asks business associations and their members to patronize railroads rather than the commercial auto bus and truck lines and use their good graces in placing the highway carriers on an equal basis of taxation with the railroads. The employees feel that the continued inroads into the railroad business by the 'bus and truck lines which operate over the public highways almost tax-free, threatens their positions as decreased business will necessitate cuts into the railroad's working forces."

The Draymen's Association of California, composed of truck owners of whom many are competing with the railroads, received from the league the following resolution:

"WHEREAS: We, the members of the Southern Pacific Good Service League, are employees of the Southern Pacific Company in San Francisco, and

"WHEREAS: Our prosperity and the continued welfare of our families are dependent on the prosperity of the Southern Pacific Company and the patronage of the Southern Pacific Company by the business men of San Francisco, and

"WHEREAS, the following facts are true and of interest to the members of the Draymen's Association, to-wit:

"(a) That the Southern Pacific Company is meeting severe competition under unjust conditions from commercial motor trucks and 'buses operating over the public highways virtually tax-free as compared with the huge sums paid by the railroads to the state in taxes.

"(b) That taxes thus paid by the railroads are used in part to pay the bill for highway construction and maintenance, a cost that is steadily increasing because of the severe usage of the highways by said trucks and 'buses.

"(c) That continued unequalized competition by the highway carriers will so decrease the revenues of our company that its service to the public will be impaired and its purchase of supplies and its employment of working forces will have to be curtailed, thereby affecting the general prosperity of San Francisco and the state at large.

"That the company's taxes in California based on 5¼ per cent. of its gross receipts for 1920 were $6,125,700;

"That the company's annual purchases in San Francisco (actual for 1920) total $17,731,800;

"That the company's average pay-roll monthly in San Francisco (actual for 1920) is $1,165,440.50;

"That San Francisco merchants and business men benefit from the company's purchases and pay-roll expenditures in San Francisco.

"NOW, THEREFORE, BE IT RESOLVED: That we, the members of the Southern Pacific Good Service League, appeal to the Draymen's Association and its members to patronize the railroads rather than the auto 'bus and truck lines and to use their good offices in bringing about a just basis of taxation for the highway carriers which will place them on an equality with the railroads, who not only have to maintain their own roadways but, in addition, contribute large amounts through tax channels to the up-keep of public highways."

This same petition, addressed to the automotive dealers' organization, provoked the action already described. As a further means of retaliation some dealers have tried water shipments of vehicles and find the service as quick and in other ways as satisfactory as rail shipment, to say nothing of the saving, the water rate being $1.50 per 100 pounds against the railroads' charge of $4.66. The threat has been sufficiently effective to force a disclaimer from the Southern Pacific Railroad in the manner referred to, although it had previously contended that it could not be held responsible for the acts of its employees. This expression followed protests against the action of the Roseville Local of the United Brotherhood of Carpenters & Joiners of America and the Local of the Brotherhood of Railway Clerks, who adopted a "We Don't Patronize" stand on the Roseville-Sacramento stage line and informed members that this line had been placed on the "We Don't Patronize" list. A motion was made to fine members for violation of this pledge, the penalty being $1 for the first offense and $5 for subsequent offenses, and representatives tried to induce Roseville merchants to sign an agreement promising not to patronize motor truck lines or stages, claiming that the city was largely supported by the railroad workers and that it was to the advantage of the latter that the railroads be patronized rather than the motor carriers. The threat of boycott was made in an effort to have the agreement signed.

At the same time petitions were circulated throughout the state in an attempt to develop enthusiasm for an initiative measure which would place motor carriers of all kinds, urban as well as interurban, under the control of the state railroad commission, which should grant franchises, prescribe terms and conditions of operation, and regulate the rates of fare and freightage. This movement was inaugurated and supported by the California Real Estate Association which, in the promotion of new subdivisions, has sought the extension of street-car lines as a means of enhancing property values, the railways refusing to make any additional investment as long as the danger of motor competition existed. Signatures to the petition have been bought at the rate of 5 cents a name and solicitors have thronged the street corners, banks and other public buildings. "Sign this petition and reduce street-car fares" is the slogan of the petition bearers, although the document contains nothing to assure the attainment of that end.

In addition chambers of commerce, real estate bodies and other business organizations have petitioned the state railroad commission, asking it to refuse further granting of franchises to motor carriers until they can be made to pay more revenue for the up-keep of the highways, and railroad

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attorneys have addressed commercial organizations with the same plea.

Under California laws all public utilities pay a tax amounting to 5.4 per cent. of the gross annual income and, although the last session of the legislature raised this percentage to 7, the railroads have enjoined enforcement of the revised statute. As the railroads' tax of 5.4 per cent. is in lieu of all other state taxes whatsoever, the motor carriers are really much more heavily taxed, for the sum of the state license, personal property and business taxes which they pay, in addition to garage and station taxes which are often levied against them in the cities through which they pass, in some cases amount to as much as 15 to 20 per cent. of the gross revenue.

The motor truck and 'bus lines have diverted traffic from the railroads because of their superior service, there being practically no difference in rates, because these are fixed by the state authorities. Freight travels 100 miles in 6 hours by motor truck, while the railways require 2 or 3 days for the same service, and in passenger carriage motor service is twice as frequent as that furnished by the railways. As a result of the public's preference for motor vehicles the railroads have suffered heavily in the loss of business, and every effort is now being made to pledge the candidates for the legislature to some definite stand on the question of motor carrier control. Eighty representatives and 20 senators will be elected in November from the primaries held August 29, and with a different complexion of the state law-making body much is expected by the railway interests.

Cab Owners Promise Co-operation

From more than 200 cities, large and small, taxicab operators met in convention at Chicago recently. Before they finished a code of ethics, expressed in a series of resolutions, had been subscribed to and an energetic campaign to instill the virtue of truth and justice into their employes decided upon. In the language of the resolutions (which will be used as advertising and pasted upon garage bulletin boards) they "will test every transaction by the standards of truth and justice." Furthermore, it was decided to "mix freely with intelligent and honorable members of the industry, study their ways and methods, and endeavor to maintain a reputation for intelligence and integrity as high-class operators whom everyone may trust."

Among other items it is agreed that the members will "esteem it a duty and a pleasure to impart to our less experienced competitors the knowledge we possess, so long as we are convinced that the information generously given will be honorably used. And we believe we may thereby eliminate that ignorant competition which destroys the business of another and does not build up its own."

The operators, in discussing their duty to the public, agreed that they "will take advantage of no man's ignorance or condition." Aside from constantly striving to elevate the moral character and the financial condition of the men employed by them, the operators will insist on courteous treatment of everyone by their drivers and safe driving on all occasions.

Trailer 'Bus Seats 66

A novel 6-wheeled 'bus unit has recently been designed by the Fruehauf Trailer Company of Detroit for the Department of Parks and Boulevards, Detroit. It is used for carrying passengers between the Jefferson Avenue bridge approach and Belle Island Park and it is believed to be the first unit of its kind to be used in the country.

With a seating capacity for 66 people it is the largest single deck 'bus in service. All loading and unloading is from platforms and, with the four folding doors provided, large crowds are handled in a very few minutes. The doors being operated by compressed air, the driver is able to control them without leaving his seat. The trailer is also equipped with air-controlled brakes connected to the driver's cab. Both doors and brakes are operated with the same valve, and it is impossible to open the doors without first setting the brakes; likewise the brakes cannot be released without the doors being closed. With the service and emergency brakes which are standard equipment on the truck, three complete and separate sets of braking systems are provided which may be operated independently or at one time, insuring maximum safety.

The 'bus is equipped with long flat springs of special alloy steel and cushion wheels which are used on both truck and trailer. The inside of the 'bus is similar to a modern street car with cane upholstered seats. The side walls of the interior are finished in natural oak and the celing in imitation mahogany. Ventilation is provided by ventilators installed in the roof and the lighting is taken care of by a storage battery on the truck. While the 'bus body is 29 feet long, the vehicle can be turned in a radius of 39½ feet, less than an ordinary long wheel base motor truck. In spite of its size the driver has no difficulty in handling it, even in most congested traffic. In fact, it is when the large crowds are patronizing Belle Island that this 'bus proves its real value, as it has carried as many as 135 passengers at one time. Within a few days its practicability was so thoroughly established that another unit was ordered to be delivered as soon as posible.

The truck is a 3½-tonner with a wheel base of 10 feet, the total wheel base being 30 feet and over all length 37 feet. Compressed air for operating doors and brakes is carried in a small tank fastened on the running board of the truck and is supplied by a pump driven by the engine. The connection to the trailer is through flexible tubing with quick detachable couplings.

One of the outstanding features of the unit is that the motor truck may be used every day in the year. The trailer is detachable and equipped with supports at the front end (ordinarily folded underneath), on which it rests when disconnected from the truck. Platform or dump-body trailers may be attached for other kinds of work. The truck is earning continuously instead of during the short summer season when carrying passengers. In the winter it will probably be used exclusively for trucking. It is believed to have great possibilities for general passenger service, on account of its large carrying capacity, and because of the quick detachable feature. If the motor truck met with an accident or mechanical troubles were encountered, another reserve power plant could be placed under the trailer body within three minutes. Thus only the truck unit is laid up and the more expensive 'bus body kept in continuous operation.

18,185 Trucks in Nebraska

The following figures show the number of trucks, cars and trailers in Nebraska on July 1 of this year:

County.	Trucks.	Cars.	Trailers.
Adams	276	2,824	9
Antelope	132	2,664	...
Arthur	14	152	...
Banner	66	244	...
Blaine	31	194	...
Boone	163	2,950	...
Box Butte	89	1,246	...
Boyd	54	1,188	...
Buffalo	228	4,131	16
Brown	41	763	...
Burt	239	2,344	9
Butler	220	2,844	5
Cass	235	2,721	...
Cedar	168	2,779	...
Chase	111	882	...
Cherry	86	978	...
Cheyenne	326	1,589	2
Clay	142	2,709	6
Colfax	191	2,105	...
Cunning	312	2,758	...
Custer	382	4,403	9
Dakota	108	1,258	2
Dawes	91	1,137	...
Dawson	202	3,062	13
Deuel	125	638	...
Dixon	130	1,991	...
Dodge	556	4,135	4
Douglas	3,047	13,204	12
Dundy	96	857	...
Fillmore	122	2,667	10
Franklin	102	1,886	8
Frontier	118	1,498	...
Furnas	163	1,454	6
Gage	344	4,849	8
Garden	93	695	...
Garfield	14	483	1
Gosper	59	982	2
Grant	17	156	...
Greeley	30	1,276	...
Hall	466	4,044	11
Hamilton	125	2,790	13
Harlan	63	1,790	9
Hayes	99	549	...
Hitchcock	87	1,176	...
Holt	118	2,239	...
Hooker	18	115	...
Howard	99	1,979	...
Jefferson	182	2,478	4
Johnson	96	1,755	...
Kearney	50	1,772	3
Keith	139	932	...
Keya Paha	25	414	1
Kimball	160	683	...
Knox	261	3,363	2
Lancaster	1,543	12,536	12
Lincoln	249	3,278	5
Logan	9	309	...
Loup	15	241	...
Madison	292	3,914	3
McPherson	29	146	...
Merrick	133	2,032	2
Morrill	61	1,255	...
Nance	83	1,458	...
Nemaha	170	2,175	...
Nuckolls	112	2,410	...
Otoe	337	3,419	1
Pawnee	105	1,831	2
Perkins	110	877	...
Phelps	196	2,267	27
Pierce	107	2,139	...
Platte	312	3,593	1
Polk	143	2,239	...
Red Willow	196	2,016	2
Richardson	251	3,050	2
Rock	33	448	...
Saline	210	3,207	10
Sarpy	260	1,453	...
Saunders	246	4,073	3
Scotts Bluff	209	2,794	...
Seward	232	3,284	15
Sheridan	87	1,276	...
Sherman	47	1,568	...
Sioux	41	506	...
Stanton	141	1,461	1
Thayer	163	2,615	8
Thomas	11	144	...
Thurston	93	1,191	...
Valley	145	1,623	...
Washington	301	2,290	1
Wayne	275	2,322	...
Webster	83	1,850	1
Wheeler	37	294	...
Wheeler	37	294	...
York	208	3,358	27
Totals	18,185	198,717	294

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Mack Bullet-Proof Body

In this present wave of crime and daring holdups, banks, trust companies, construction companies, contractors, chain-store organizations and silk houses find it necessary to use every precaution for the safety of the men involved in the transfer, delivery or collect on of large sums of m ney or valuable goods. The motor truck is used extensively for this form of transportation, but the usual type of motor truck body does not offer adequate protection, so in order to overcome this hazard a special body mounted on a Mack chassis, has been designed, the appearance of which is misleading to the highwayman, due to its similarity to the ordinar light delivery body. The entire inte ior is lined with a light tough bullet-proof ste.l. capable of resisting the largest revolver bullets at close range. All the windows, windshields and portholes are fitted with shatterless bullet-proof glass, and the windows and porthole shutters are fitted with geared window lifts to hold them in any position desired. No running boards, door handles or other unnecessary projections are afforded the thug who attempts to hold up the truck while in motion. A step is provided at the entrance door, of course, but it automatically folds up when the door is closed. In place of the usual seat in the cab running its entire width, a single driver's seat is provided, which makes available a space for a locked door connecting the cab with the body.

In addition to the driver in the cab it is customary to carry one or two guards inside the body. These men deliver the securities from the truck to the destination under the protection of the driver. They in turn protect the driver and the car en route. The inside of the body is provided with folding cushion seats, dome lamps, ventilators in the roof, and an exhaust heater for use in cold weather. Several rifles and revolvers are supported on convenient racks, and are kept loaded for instant action. The six portholes provided, including one opening back of the cab, give ample range to reach any point, near or distant, on all sides of the truck. An extra emergency brake is fitted inside the body operating independent of the cab controls, so that the men in the body have control over the truck in case of accident to the driver.

There is a small desk in the forward part of the body for the convenience of paymasters and collectors and a paying teller type window is also provided for paymasters.

All doors are equipped with patented locks and a forced entrance would be practically impossible even though the truck were not in motion.

'Buses Must Stop at Railroads

Under a rule adopted by the Public Utility Commission of New Jersey, all operators of motor 'busses subject to the jurisdiction of the board must come to a full stop before crossing the tracks of any railroad. Failure to comply with the order will be sufficient cause to withdraw the approval of the permit obtained from the respective municipalities to operate motor busses.

Soft Drinks Sent 29 Miles at 2.9 Cents a Case

By CHARLES K. WOOLNER

President and General Manager, City Brewing Compa. y, Toledo, Ohio

OUR 2-ton truck is the tenth or eleventh truck we have owned, and the appended cost sheet is the best record ever made by one of our fleet. The truck is used chiefly for city work, delivering goods to the drug stores, ice cream parlors, soft drink stands, etc., who are our customers. It averages 125 cases a day throughout the year, but, of course, in the summer time, the daily average is much higher.

Once a week it runs to Bowling Green, to supply our customers there. It makes the 48-mile round trip in about 5 hours, handling 100 cases on the trip. The roads are good on this run; but on account of the time required for unloading full cases and picking up empties, we consider this good time In one year, this Garford truck worked 306 days and traveled 10,520 miles, an average of 34.4 miles per day. Total repairs to date have been under $100, but we are allowing $300 per year for maintenance and repair. The truck is depreciated on a minimum life of 85,000 miles.

The tires of the truck are the orginal set. They have run, by the odometer, 10,520 miles, so we feel sure that they will last at least 11,000 miles. We own the building which is used as a garage, but believe $10 a month should be charged against each truck as garage rent.

The truck is costing us $16.51 per day. This includes $10.61 per day for driver and helper. A helper is really necessary only eight months in the year, but this man has been with us so long we carry him the year around. We charge only eight months of his time against the truck; but as both driver and helper put in considerable overtime during the busy season this item remains pretty high.

On an average day for the year the truck travels 34.38 miles and delivers 125 cases, at a cost of $16.51 per day or 13.21 cents per case. On the weekly trip to Bowling Green it runs 48 miles in 5 hours. The cost of this trip is:

Variable expense (48 miles at 13.21c)	$6.30
Fixed expense (5 hours at $1.394 per day)	.87
Driver's and helper's wages, 5 hours at $10.606 per day	6.63
Total expense of trip	$13.80

Delivering 100 cases, the cost is 13.8 cents per case, and 2.9 cents per case mile.

Our record for the year shows:

Operation.

Days operated	306
Miles traveled	10,520
Miles per day	34.38
Miles per gallon of gasolene	7.6
Miles per gallon of oil	114

Average Cost.

Cost per day (including driver and helper)	$16.51
Cost per mile	.48
Total cost for period	$5,052.33

Itemized Cost.

Driver and helper cost per day (including above)	$ 10.61
Depreciation per mile	.0343
Maintenance and repair:	
Actual, total	100.00
Actual, per mile	.0095
Estimated, per mile	.0285
Tire cost, estimated per mile	.0238

Selden-Atlas Men Confer

"There is an opportunity before Selden and Atlas men now that comes to very few men. There is as big a future in store for the Industrial Motors Corporation as for any other organization in the country." So said Geo. C. Gordon, president of the Selden Truck Corporation of Rochester in opening the three-day conference of Selden-Atlas men held there July 20, 21, and 22. "The Industrial Motors Corporation is headed by such men as John J. Watson, Jr., Frederick M. Small and Reeve Schley—men who have never failed to 'make good.' And Mr. Watson says the new organization will be his greatest work. We have the opportunity, we have the goods, we have the men—and we will 'make good.'" These were further remarks in Mr. Gordon's talk.

The Industrial Motors Corporation, a holding company, was organized with a view of merging the interests of many manufacturing concerns. The Selden Truck Corporation and the Atlas Truck Corporation, York, Pennsylvania, were the first companies to enter.

The truth of Mr. Gordon's remarks was brought out forcibly, as the Selden-Atlas conference progressed. For years it has been the custom of the Selden Truck Corporation to call twice a year a conference of all field men. This practice will be continued under the Industrial Corporation. Much credit for the success of this conference must go to Hal T. Boulden, vice-president of the Selden Truck Corporation, and sales director of the Industrial Motors Corporation. Mr. Boulden presided at all meetings and the men in attendance say they never received so much "real stuff" before. During the various sessions all phases of the motor truck business were discussed, from the angles of the manufacturer, the field men, the dealer, the local sales men and the owner. From all points of the country reports were made that business was on the up grade. No one predicted any great sudden development, but rather a steady, sure increase in business to a point where prosperity was assured.

The Industrial Motors Corporation has turned over to the Selden Truck Corporation the advertising and sales of Atlas trucks. This gives the Selden organization a complete line of trucks, ranging from ¾ ton to 7 tons. The policies of the corporation will be governed by a special committee including Frederick M. Small of the Martin-Parry Corporation, Allan Cosgrove of the Atlas Truck Corporation, George C. Gordon and H. T. Boulden of the Selden Truck Corporation.

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A Light Motor Vehicle for Fire-Fighting Duty

By F. WINTERBOTTAM

ALTHOUGH the manufacture of motor fire-engines costing over $5,000 has been successfully carried out for some years, the problem of the small self-propelled fire-engine does not, until recently, appear to have been seriously considered by the makers of large engines, although the demand for a machine of this class has been urgent for some time.

The principal conditions to be met in designing a small motor fire-engine are:

(1) The engine must be light in weight, so as to be able to travel over the grass, soft earth, etc.

(2) It must be simple, and not require skilled and highly trained attendants, and must be able to withstand neglect and abuse without risk of suffering permanent damage.

(3) It should preferably be of a type that is already known and understood everywhere, and for which spare parts can be readily obtained.

(4) Most important of all, the price must be moderate, say, not exceeding about $2,500.

On considering these conditions, it will be evident that the design of a suitable machine is really much more difficult than in the case of a larger one, where the question of expense is not so important; and there are on the market several makes of chassis which can all be easily modified to carry any one of several known and tested designs of pumps.

Considering the fourth condition only for the moment, there are three general methods of dealing with this problem.

The first is to utilize an old chassis of low value, and erect on this a piston or other type of pump. This course does not appear to have much to recommend it, as, although its cost may not be excessive, it will often fail to comply with the first conditions, and it will almost certainly not satisfy the second and third conditions, especially as regards the item of spare parts.

The second method, and one which is receiving considerable attention in England at the present time, is to utilize a small internal-combustion engine and an up-to-date type of pump, and erect these on a light 2-wheeled chassis, which can be man-handled or trailed behind an ordinary motor vehicle. There is, no doubt, some scope for this type in cases where the pump will not be required any great distance away from its station, but for general use it is open to several objections. In the first place, it necessitates another motor for towing purposes; and, in the second place, it cannot, itself, carry any men and equipment. Hence, it will be necessary for the towing motor to be adapted for this purpose, and to be always stationed with the trailer at the fire station, as otherwise considerable delay might occur in getting the towing motor to the station and loading it up with hose and other equipment.

The third method is to design a complete self-propelled motor fire pump on a new chassis. Again considering the four conditions already mentioned, it is fairly obvious that the only chassis that can be considered at the present time is a certain well-known low-priced machine. It is made of good material, is low in price, is light in weight, and can travel over practically any surface. Spare parts can be obtained at almost any village throughout the country, and, moreover, these parts are not expensive.

As a complete self-propelled fire-engine, based on such a chassis, has recently been announced, and is claimed to be the first low-priced motor fire-engine ever built, some particulars of this engine, known as the Stanley, will be interesting.

The Stanley design consists of a small, high-speed, single-stage turbine pump, mounted in a well-protected position about the middle of a Ford chassis, and driven by suitable gearing and shafting from a gearring built into the flywheel of the motor. A turbine type of pump was chosen for several well-understood reasons.

When working at the pressure desirable in a small fire-engine, the efficiency of a single stage pump can be approximately the same as in a multi-stage pump. Actual experience indicated that it was preferable to place the pump in the center of the chassis instead of at the rear, as is done on practically all motor pumps in England. In the Stanley design a large gear-wheel, built in the flywheel of the motor, drives a small pinion, housed on the top of the transmission cover. A small clutch is placed on the outside of the pinion housing, and the drive is taken by a short shaft to the pump spindle. A small single-cylinder priming pump actuated either by hand or by power, is fitted close to the dashboard, and in practice this has proved quite satisfactory. Special arrangements are made to circulate cold water through the cylinders, and no overheating troubles whatever have been encountered. An additional oil supply to the front end of the crank-case is provided for, and the latter is taken through a sight indicator, so that, when pumping, the attendant can at all times make certain that the oil system is functioning properly. Oil cooling is necessary, and special provision has been made for this.

The Stanley fire-engine is rated at 150 gallons per minute, although the pump at present fitted has a somewhat less capacity. The production model, however will be fitted with a much more efficient pump of a somewhat similar design. The existing pattern is, however, capable of throwing two 5/8 inch jets over a three-story building, or a single 3/4 inch or 7/8 inch jet to a greater height, and it has actually been proved capable of throwing one useful 5/8 inch jet at the end of 1,000 feet of hose.

Like any other motor vehicle, a fire-engine requires attention at times, and is, of course, quite useless if its services happen to be required while under repair. Again, accidents are liable to happen on the road, and in the event of a large machine which is the sole equipment of a brigade being incapacitated by a collision on its way to a fire, in many cases it would mean either that the fire would burn itself out or would be left unchecked until another engine could be called in. If, however, two or three small machines are installed, any one of them can be taken into the repair shop without reducing the efficiency of the brigade to nil. Again, the members of a small brigade never reach the station together, and if only one engine is available it means either that some delay is caused while waiting for sufficient members to arrive or that the engine turns out insufficiently manned. With two or three small engines one could turn out when three or four men arrive at the station, and the other machines follow as more men are available. A large machine involved in an accident generally means a very expensive repair bill, but a fire engine of the type described can be involved in a serious end-on collision and yet be repaired by a local Ford agent and be on the road again within 24 hours at a very small cost. At least one light machine capable of traversing soft ground ought to be included in the equipment of every brigade now relying solely upon large and heavy machines, which, in some cases, would have to travel over ground on which they are liable to become bogged.

$2,000 Investment Grows to $29,726

"My old train has made 28,000 miles up to March 1, 1922, with less than $50 for repairs aside from collisions, and has drawn a 10-ton trailer 98 per cent of the time," says B. F. Stead, president of the Mogul Transportation Company of Detroit, in speaking of his Mack truck and Fruehauf trailer equipment. "From February 3, 1921, to June 1, 1921," he added, "this train transported 1,357,930 pounds of freight with a gross revenue of $1,805.40. From June 1, 1921, to March 1, 1922, I transported 6,110,685 pounds of freight with a gross revenue of $8,124.30. The difference in these figures is due to the Michigan state highway law, which reduced the loads to about one-fourth of their former weight, during the February to June while it was in force.

"With my new 5-ton Mack I draw two 7-ton Fruehauf trailers with 5 tons on each unit, making 80 miles in 12 hours or 30 tons for the round trip to Detroit. This truck is geared to 11 miles an hour and will draw two trailers with 20 tons of freight on reasonable highways. My old train has on several runs made schedule time with 25 tons of freight traveling at the rate of 15 miles an hour.

"The original investment of $2,000 made February 1, 1921, is all the money invested except the earnings from my first unit placed in operation. I now have $29,726.97 worth of equipment. I will soon place in operation another train and perhaps two, which I think will be necessary to take care of my ever-increasing business."

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British Army Truck Specifications

By OBSERVER

OUT of its experiences in the late war the British War Office has prepared specifications for a new standard type of army motor truck, a 3,360-pound chassis mounted on pneumatic tires, propelled by a 4-cylinder engine of 24 horse-power with pump-driven water circulation, high-tension magneto, four forward speeds, bevel or worm drive, an engine-driven tire pump, detachable wheels and detachable rims, having a maximum chassis weight of 3,248 pounds, a total weight of 4,368 pounds and a speed of 30 miles per hour. In view of the low load capacity provided for it is apparent that the army attached great importance to mobility.

The object of the War Office appears to be to get a type of vehicle superior to anything now made in Great Britain, whose merits shall be as valuable and conspicuous in commercial as in war service. The government will not subsidize vehicles of the type specified in the new order, but hopes that its recommendations will make the vehicle so popular that purchasers will buy the type in large numbers. Orders are being placed with British firms for a number of chassis conforming to the specifications drawn up. The following particulars embody the principal provisions of the complete specifications as laid down by the Motor Transport Advisory Board.

Engine.—Internal combustion vertical 4 cylinder using commercial petroleum spirit. Minimum cylinder bore, 100 mm. Minimum R. A. C. rating, 24-horse-power, maintainable for not less than three hours at a speed equivalent to 22 miles per hour road speed. Inlet and exhaust valves must be mechanically operated and inclosed in dust-tight covers and readily removable without affecting cylinder holding-down bolts. It is desirable that, in the event of fracture, the parts of valve can not enter the cylinder.

Lower part of the crank case must be removable without disturbing main bearings, though for engines with crankshaft ball-bearings this is not essential. Timing chains, if employed, must be capable of adjustment for wear or stretch. Lubrication must be insured satisfactorily to bearings and pistons under all conditions. Test plugs for high and low oil level are required. Plunger-type lubrication indicator to be fitted, preferably to crankcase with extension to the dash visible to driver. Large oil filter easily withdrawable, preferably without loss of main body of oil in crank case.

The bonnet must be entirely removable. Engine not under driver's seat. Exhaust pipe as far as possible outside under-shield.

Ignition.—Approved high-tension magneto. Fly-wheel marked pointer fixed and stamped directions for valve timing. If spark variation automatic, control for connecting up the contact breaker of standard magneto should be provided in case one should have to be fitted in replacement. It is desired that magnetos as standardized in British Engineering Standards Association's Report, No. 80, dated 1917, be fitted, but whatever type employed it should be interchangeable with the standard; also desirable that magneto couplings be standardized as in same report; if not, standard coupling should be able to be fitted.

Starting Handle.—Must have detachable and renewable dogs on both crankshaft and handle spindle. Engageable in two positions 180° apart. Folding or detachable handles not desirable. Handle preferably carried on crankcase extension and locking device to keep it vertically above center when out of use.

Fuel Consumption.—To be not more than one gallon per 40 gross ton-miles at ordinary speeds.

Cooling System must be capable of efficient working under all conditions or of simple modification to be effected in tropical climates. Cooling water should not exceed 100° above atmospheric temperature. There must be provision for fitting temporary cover or apron in cold weather. Circulation must be all pump, and workable by thermo-siphon if pump fails. Unassisted thermo-siphon not accepted. All parts to be capable of adequate drainage, preferably by one accessible cock not less than ½ inch bore at lowest point, so fitted as to preclude danger of accidental opening. Radiator, of vertical gilled tube pattern, to be so carried as not to be damaged by chassis distortion; radiators with shell independent of radiator proper are acceptable, but it is desired to insure against leaks arising from bonnet vibration against water-containing space. Minimum internal diameter of gilled tube ⅜ inch, as this is the smallest size which will not retain water or globules of water by capillary attraction. Suitable provision for cleaning water jackets and passages. Filler cap opening at least 2½ inches diameter, cap hinged and secured by screw, without loose parts, overflow pipe not less than half an inch more. Stout protecting bar or tube at 1½ inches diameter in front and across center of radiator supported from the frame. Large diameter fan close to radiator. Flat type belt preferable to V. Fan drive readily accessible for repairs and adjustment.

Fuel Tank capacity not less than 15 gallons. Proper supply to engine maintainable on all gradients specified and any road camber. Gravity feed with two-way cock, retaining 2½ gallons. The fuel cock to carbureter operable from outside the frame. If pressure system adopted, an auxiliary gravity tank holding at least 2½ gallons required, with cock on main fuel tank, enabling pressure supply to be shut off. Pressure gage of approved pattern to be provided. Vehicle should be able to travel 200 miles fully loaded on its tank and spare gasolene supply contained in two or more 2-gallon tins in special rack provided as part of the truck equipment.

Tanks to be made of *(a)* welded steel galvanized after making; *(b)* copper or brass, brazed or riveted and specially stayed where joints are soldered. No objection to tinned sheet steel if tanks of approved quality and design. Lead-coated steel not desired. Fuel gage of approved type. Adequate gage filter and means for clearing tank. Filter outside vehicle frame. Filler cap, minimum diameter 2 inches, hinged and secured by screw without loose parts. In supply system easily accessible filter of ample dimensions, placed so that gasolene leakage can not fall on exhaust pipe.

Clutch.—Plain cone or single disk. Multiple disk not desired. Special attention to lubrication of clutch spigot, and withdrawal collar or thrust bearing. An efficient stop to be provided. Ample wearing surface, and sufficient and accessible means of adjustment.

Transmission.—Vehicle to climb hard-surfaced gradient of 1 in 4 with full load. Able to stop and restart on a gradient of 1 in 5, forward and reverse. Low speed reduction of 35 : 1. Desirable ratio between high and low gears about 5 : 1. Reverse gear preferably lower than low. Four speeds and one reverse. Gate change (diagram of arrangement of dash), preferably of type shown, with safety catch for reverse on lever. Accompanying the specification is a diagram of the change speed gate, which insures standardization in change-speed procedure with all makes, so that a driver accustomed to one make will feel at home on another. Maximum oil level indicator plug on gear box. Speedometer and odometer drive desirable from transmission.

Final Drive.—Live axle preferably fully inclosed. Straight-tooth bevel or worm drive. Double helical drive not accepted. Single helical or spiral gear may be, after special consideration. Wheels preferably detachable from axle shafts, or shafts withdrawable to free transmission for towing purposes.

Universal Joints.—Laminated fabric or leather preferred, though laminated metal acceptable; metal joints of inclosed type or adequately protected. (This also applies to steering.)

Axles to have suitable platforms near ends for jack, preferably same height front and back axles. Also tie-rods undesirable for rear axle casing.

Wheel Bearings.—Preferably of taper roller type; floating bush and ball-bearings may be accepted.

Wheels, Rims and Tires.—Detachable steel disk or steel wheels with detachable rims or flanges. Provision for non-skids required. Non-skids should not increase overall dimensions more than 2 inches in any direction from center of tire section. Short lengths of curb chain attached by permanently fixed hooks preferred.

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For beaded edge tires all standard size as per British Engineering Standard Association's Report, No. 70, dated 1919.

Pneumatic of same size. Not less than 36 inches diameter of ample section. Large singles preferred, but dual tires on back wheels may be accepted.

Tire Pump.—Power-driven, preferably from transmission, and with body efficiently cooled, should be an integral part of design, with efficient oil filter and pressure gage. To be of adequate dimensions, capable of pumping one tire to full pressure in 5 minutes.

Speed.—Vehicle to be capable, when fully loaded, of 30 miles per hour for one mile on level and good surface, and of maintaining 22 miles per hour for 2 hours. Able to climb average gradient of 1 in 10 fully loaded at 8 miles per hour. At speed trials the governor gear may be removed. (Gradients measured as the ratio of the vertical rise to the horizontal distance.)

Useful Load.—3,360 pounds, plus equivalent of body weighing 1,120 pounds, plus driver, passenger, fuel, oil, water, and full equipment.

Turning Circle.—Maximum 45 feet outside diameter, preferably less.

Steering.—Easily controllable, all parts of dimensions to resist wear and shock; to be well protected. Steering box anchored right side of frame; front wheel stops to prevent tires fouling chassis, should preferably be adjustable.

Chassis.—Weight not more than 3,248 pounds inclusive of radiator guard, front mudguards, bonnet, dashboard, tires, lamp brackets, towing attachments, but not water, oil, or fuel. Fitted and driven bolts preferred for parts liable to replacement. All holes to be drilled. Minimum ground clearance 10½ inches, but more desired, particularly at center. Engine and transmission three-point supported. Chassis frames of substantial section, not weakened by holes in flanges at positions subject to severe stresses. Overall width, maximum, 7 feet; wheelbase 12 feet; track, 6 feet 6 inches, minimum 4 feet 6 inches, should approximately be 5 feet 6 inches from center to center of tires. Vehicle should be able to travel on hard bottom at slow speed through still water 18 inches deep. Springing to give range of 4 inches up and 3 inches down from fully loaded standing position. All springs to stand repeated deflection of 3 inches beyond the normal when fully loaded.

Spring Leaves.—Road spring leaves should be to one or more of the following sections: Width 2½ inches, thickness ¼, 5/16, ⅜, or 7/16 inches; width 3 inches, thicknesses ditto; width 3½ inches, thicknesses ⅜ or 7/16 inches; width 4 inches, thicknesses ditto. This gives a choice of twelve sections.

Towing Devices.—Substantial shackles at front and back with provision for central rear drawbar spring buffer type. Chassis frame to be braced against diagonal pull in any direction up to 20° with longitudinal axis of frame.

Control.—Clutch pedal left, brake pedal right, to be marked C and B respectively. Accelerator pedal preferably central. Top of pedals adjustable to slope. Clutch and brake pedals to work independently. Pressure to operate pedals should permit of easy control by average driver. Brake lever, to pull on, to right of change-speed lever and well away from it.

Throttle and Ignition Control.—Both independent of steering wheel movement and both moving forward on a rack to increase engine speed. Should have index plate to show effect of such movement. Throttle operable by hand combined with foot control, so that on releasing the latter throttle returns to position set by hand. All connections by rod or tubes, not wires or chains.

Brakes.—Two; one hand, one foot, to be independent, and either capable of stopping and holding the vehicle, fully loaded, on a gardient of 1 in 5. Each brake to permit continuous application without the other for half a mile on an average gradient of 1 in 12 at not less than 8 miles per hour with vehicle fully loaded and gear lever in neutral. All wearing surfaces large and easily renewable; brake shoes and drums with easily detachable and renewable wearing surfaces. All adjustments accessible; should not need special tools. The brake acting on driving wheel drums to be compensated.

Body.—Weight not to exceed 1,120 pounds. Secured to chassis preferably by clips.

Driver's Seat.—With hood or canopy separate from body; with at least one inch clear between canopy and body. Should be easily removable. Seat to carry two men comfortably on driver's left. Minimum width to center line through steering column 4 feet 2 inches. Seat back suitably padded, leather-covered cushions, with springs besides hair or suitable stuffing. Dashboards and footboards approximately same width as driver's seat, and dash or extension to protect seat occupants from weather and allow, if desired, use of an apron without fouling steering wheel. Detachable canvas screens to both entrances. Cape cart hood or light canopy to protect driver. When required for tropical climates driver's canopy should have 2 inches air space, and there should be ventilators. Also ventilators on dashboards.

Tool and equipment locker under driver's seat, readily accessible from left side. Provision to be made for rack with bar and padlock under the body, to carry three standard 2-gallon fuel tins each side.

Undershield attached by spring clips, so as to be readily removable without tools, to extend back to transmission, and have one or more drain-holes.

Lubrication.—Oil throughout chassis desired in preference to grease. Wick-feed lubricators wherever possible. Loose lubrication caps should be avoided. All lubricators accessible and not requiring special tools. Engine lubrication to be capable of at least 200 miles, fully loaded, without replenishment, and all lubricators for engine and transmission to work efficiently with War Department standard lubricants as in appendix. Legible lubrication diagram, preferably engraved on metal, to be attached to dashboard, showing also order of ignition.

Ball and Roller Bearings.—It is desirable that these should be limited to standard sizes in British Engineering Standards Association's reports: (*a*) a single-row ball journal bearings, interim report C. L. 2582, April, 1919; (*b*) ball- and roller-bearings, A. 8, February, 1919.

Screw Threads.—To be as far as possible British Standard fine screw, as per British Engineering Standards Association's report No. 84 of June, 1918. The following threads will also be accepted: British Standard Whitworth for bolts and nuts, B. E. S. A. Report No. C. L. M. 7270. British Standard screw threads for brass and copper tubes, B. E. S. A. Report, No. 61 of 1913. Other threads require special consideration.

Materials.—It is desirable for these to accord with specifications of British Engineering Standards Association, and high tensile steels should be stamped letter "T" followed by tensile strength. (Thus a steel of 50 tons ultimate tensile strength would be marked "T 50.") Manufacturers to satisfy War Department that any material used in construction and not obtained in this country, could in the event of war with any powers, be obtained in suitable quality from British firms.

Repairs and Maintenance.—Due consideration to be given to accessibility for inspection, adjustment, replacement, and repairs. It is desirable that provision be made for second and third standards for replacements of parts subject to heavy wear, as pistons, brasses, bushes, and pins. Engine frame, transmission, and rear axle to be clearly marked with an assembly part number.

Cylinder Castings.—The following hydraulic test is suggested: Inside 500 pounds per square inch; water jacket, 10 pounds per square inch, without weeping under test.

Spare Parts.—Illustrated detailed list provided for each vehicle, with part numbers shown, and, when possible, parts themselves to be marked with catalog spare part number. Second and third standards to be marked in addition.

Drawings.—To be supplied with each vehicle, general arrangement plan, side elevation, back and front elevations, and plan elevation and sections to show clearly full details of radiator; engine (both sides to show fan drive, carbureter, magneto, water and oil pump); clutch and its operating and mechanism; change speed-gear; rear axle and differential; transmission; propeller shaft brake and mechanism; rear wheels, hubs, and outer axle ends, springs; brakes; radius and torque rods or tubes; steering-gear; front axle, showing springs, stub axle arms, and steering connections.

Instruction Hand Book.—Together with lubrication chart with each chassis. Illustrated where necessary to show methods of adjustment.

Tests to Be Carried Out.—From the schedule of tests which will be appplied to the new vehicles, after the weights have been ascertained, with the vehicle empty and fully loaded, speed tests will be carried out from a flying start for a distance of at least one mile on a level road in which the gradient does not exceed 1 in

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50 at any part. The average speed in miles per hour will also be maintained for a period of two hours on a selected average road of hard surface, including gradients not exceeding 1 in 15. A hill-climbing test will also be made up a gradient 1 in 10 on hard road surface.

A brake test in forward and reverse directions will be carried out separately with the foot and hand brakes respectively, with the gear lever in neutral position, on a gradient of 1 in 5 from a minimum initial speed of 5 miles per hour. The vehicle will also be controlled by the continuous application of each brake separately for a distance of half a mile at an average speed of, approximately, 8 miles per hour down an average gradient of 1 in 12, to determine if excessive overheating occurs, or causes the lubricating oil to fire.

Restarting tests will be carried out with the vehicle brought to a standstill while climbing a gradient of 1 in 5 with both forward and reverse gears engaged, without the aid of a scotch or sprag. The minimum turn radius will be tested for both right and left lock, and will be taken as the outside diameter of circle made by track of the steering wheels.

A fuel consumption test will be taken during the average road speed test for two hours' duration, and, secondly, on a level road.

Trials on rough ground will be conducted to test the application of non-skids and their attachment, overheating of radiator and spring mounting arrangements. These will include a trial on soft sand between 8 and 10 inches deep, an unmetalled lane with soft surface, and on boggy ground.

The effect of frame distortion on engine and gear control will be tested by jacking up one front wheel till the other is off the ground with the vehicle fully loaded. During this test it must be possible to operate the steering wheel, clutch brakes, change-speed lever, starting handle and engine hand controls without difficulty.

There will also be a water splash test, when the vehicle will be driven through slow running water, 8 inches deep, with a hard bottom, at a speed of 10 miles per hour. This must not affect the running of the engine, magneto, or carbureter.

The mechanically operated tire pump will also be tested, and will be required to inflate a completely deflated tire up to the pressure advised by the tire makers. The time taken, the heating effect on the pump body, and passage of oil vapor will be observed.

During the final examination of the chassis it will be liable to additional minor tests, to ascertain interchangeability of detachable wheels and rims, adjustment of brakes, accessibility, methods of lubrication, driving and steering control, strength and accessibility of towing devices, etc.

No mechanical or structural alterations will be permitted during the tests without approval, though changing of spark plugs will be allowed.

Over 1,000 suburban homes near Sacramento, California, are dependent chiefly on the motor vehicle for transportation, according to the real estate board of that city.

Co-operative Department Store Operates 47 Trucks

By THOMAS HASKELL

A MERCANTILE institution that does an annual business in excess of $13,000, has an intricate problem in haulage and delivery. That is why the express department of Zion's Coöperative Mercantile Institution, under the management of R. J. Strong, is an interesting study to other concerns engaged in parallel lines of business. The "Z. C. M. I." of Salt Lake City, as it is known to the trade throughout the intermountain region, is the oldest department store in America and still one of the largest. Besides an extensive retail and wholesale business, it owns and operates a large shoe and clothing factory. It makes retail delivery three times a day in Salt Lake City and has a record of 2,000 parcels in a single day.

About five years ago the institution had in its express department 96 horses, and its haulage units were exclusively horse-drawn vehicles. Today it operates a fleet of 47 trucks and has only two horses left as a remnant of the old days.

The garage is one of the largest and most completely equipped in the entire country. It is steam heated throughout and has every shop facility needed in expert repair work and overhauling. The mechanics are efficient and thorough. All washing, painting and repairing are done in the institution's own plant.

No driver is allowed to make any sort of repair. He may not even fix a puncture. All this work is handled by the shopmen themselves. The driver, however, must watch his truck vigilantly and make a daily report of its condition. The rule of keeping the same driver on a truck, it is believed, maintains and stimulates interest in the care of the vehicle; and serves better to fix responsibility for its condition.

Every truck is inspected daily by its driver and the trouble reported at once. Besides this, each unit is given a thorough overhauling at regular intervals. The standard color of the trucks is battleship gray and the painted surfaces are kept always fresh, smooth and clean. All trucks are varnished every six months. The shining appearance of the fleet is made to reflect the ideals and the high standard of the concern that operates them.

Superintendent Strong has developed a unique cost system. A monthly summary shows an itemized statement of everything including depreciation, charged against the car and its operation. This statement is compiled from the driver's daily report sheet. The system is so minutely perfected that even the cost per package delivery is known. If any unit of the fleet is not doing a full day's work through some inefficiency of schedule, the fact is immediately detected and steps taken to apply a remedy. Total mileage for the month, individual trip mileage, number of delivery stops, pounds carried, number of packages delivered, hours car is in shop, oil and gasolene consumed, are data that figure in the summary statements.

Statistics kept over a period of several years show that Z. C. M. I.'s trucks are being operated economically and that no mistake has been made in standardizing on several well known makes. The superintendent is well pleased with the performance of his machines.

There is a human side to the management of the Z. C. M. I. express department that should have a word of mention—the men are all well compensated, which makes for stability, efficiency and permanency. Their quarters are also equipped with every convenience.

Urges Truck Repairing Now

In view of the danger that transportation facilities may be overtaxed during the next few months if the railroads should find themselves out of operation from strikes now impending, the Autocar Company has advised owners of its machines to prepare now for the coming high-pressure service that their vehicles will probably be called upon to perform. In a letter addressed to "all Autocar truck owners throughout the United States." David S. Ludlum, the company's president, says:

"We feel assured, because of action now being taken, that a sufficient amount of coal will be mined and that it will be transported by rail and waterways.

"Distribution will be controlled, making necessary piecemeal delivery. This will require a tremendous increase in the number of vehicles to do the work.

"During the months just ahead increased industrial and agricultural transportation necessities must be taken care of at the same time that this extraordinary amount of coal is being handled. It is therefore more than likely that embargoes will be placed on short hauling of general merchandise. Such a ruling will make necessary a heavy and immediate increase of motor truck transportation.

"We therefore suggest that you look over your equipment and, if it needs any repairing or overhauling, that you have it done now, or if, instead of overhauling or repairing, you wish to trade for a new or larger truck, do it now. If you need additional trucks, purchase them now.

"Our sales and service stations in your territory will do everything in their power to quickly get your trucking equipment in first class shape to handle your business. The coming months of September, October, November, December, January, February and March, we believe, will burden the nation's transportation facilities to the limit.

"We want to serve each and every one of our customers to the best of our ability and we ask your co-operation in ordering now anything that you may require."

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Delivers Milk on 25½-Mile Trips at 28.2 Cents a Can

By LOUIS SMITH

Vice-President, Smith Brothers Suffin Milk and Cream Company, New York City

BY increasing our delivery radius, motor trucks have brought us 30 per cent. more business in the last three years. We are operating a large dairy in the heart of New York City, and make our deliveries with horses and motor trucks. We use 37 horses on the short-haul work, taking in the territory between 42nd Street and the Battery. The trucks work the longer routes, covering everything within a radius of 10 miles.

Our first Selden truck was a 2½-tonner which we ran for over a year. We needed a different capacity, so we turned it in toward a 3½-tonner in November, 1920.

This truck has a regular route which it covers 7 days a week. It starts out early in the morning and goes to the Weehawken terminal, where it is loaded with an average of 65 10-gallon cans of milk. These it delivers to about 46 different stores, restaurants, and other wholesale customers in Brooklyn. The loads vary somewhat, but never exceed 90 cans. On its rounds the truck also picks up the empty cans.

In its 6 months' service this truck has not been laid up for a single day, and has traveled nearly 5,000 miles. The actual cost for repairs has not exceeded $50, and we estimate that $300 a year will cover maintenance and repair, including a thorough overhaul. We are depreciating the truck on a minimum life of 45,000 miles.

The wholesale milk business is particularly hard on a truck, because it has to operate 365 days in the year. On the other hand, it is a pretty serious matter for us to have a truck laid up, for this almost invariably means delays in making deliveries to our regular customers. For this reason we appreciate the dependability which we have always found in our trucks.

Our 3½-tonner costs $18.35 a day, 28.2 cents per can, and 22 cents per can-mile. These figures include the unusually high driver cost of $8.71 per day, because the driver works 7 days a week and receives double pay for Sunday.

These are very satisfactory costs which horses could not equal, because they could not cover the mileage. A motor truck gives much better service than would be possible with horses, and we feel that we couldn't get along without trucks for our longer hauls. By increasing our delivery range and giving better service to our customers, trucks have increased our business fully 30 percent. in the last three years.

OPERATING RECORDS.

Total Period.

Period covered	6 months
Days operated	182
Total rounds trips	182
Deliveries—pickups	8,372
Total loads—full cans	11,830
Miles traveled	4,670
Gasolene, gallons used	1,557
Cylinder oil, gallons used	45½

Daily Averages.

Round trips	1
Deliveries—pickups	46
Total loads—full cans	65
Miles traveled	25.5
Miles per round trip	25.5
Load per trip—full cans	65
Can-miles	828.75
Miles per gallon gasolene	3
Miles per gal oil	102½

COST RECORDS.

Investments.

Chassis, etc., complete	$4,825.00
Tire value	311.40
Total, less tires, to be depreciated	$4,513.60

Fixed Charges—Yearly.

Interest on total investment (5 years) @ 7%	$ 202.65
Taxes and licenses	35.00
Insurance	400.00
Garage expenses	420.00
Total per annum	$1,057.65
Total per month (per day $2.92)	88 14
Total for period—6 months	528.82

Variable Charges—Period.

Fuel at 28 cents a gallon	$ 435.96
Cylinder oil at 54 cents a gallon	24.57
Tires—4,670 miles ($311.40 ÷ 10,000-mile life)	145.24
Depreciation—4,670 miles ($4,513.60 ÷ 45,000-mile life)	468.40
Maintenance and repairs (estimated)	150.00
Total variable charges (per day $6.72)	$1,224.17
Driver's wages, helper (per day $8.71)	1,586.00
Total fixed charges	528.82
Total operating costs	$3,338.99

Unit Costs.

Cost per day operated	$18.35
Cost per mile traveled	.715
Cost per full can hauled	.282
Cost per can—mile	.022
Repair cost per mile—estimated	.032
Repair cost per mile—actual	.011

Packard Bonus Plan

As a reward for accuracy and pride of workmanship and to stimulate production, the Packard Motor Car Company has inaugurated a new system of bonuses for its employees that is bringing about all the results sought. The new plan, instead of awarding a bonus to the individual worker, adds a certain per cent. to the pay envelope of every man in a department when the record of that department's output shows an increase.

Thus, for each one per cent. in increased efficiency in the department, one per cent. is added to the salary of each worker in that division. It has been found that inasmuch as any greater efficiency displayed by an individual tends to raise the combined standard of all the employees in a department, the new bonus system creates a spirit of coöperation which, it may be, could be obtained in no other way. The saving in accounting, when the new system is compared with the individual bonus plan, is at once obvious.

"Each worker in a department has a personal interest in the entire work of his department," the company finds. "Laxness, loafing or carelessness in workmanship for that reason are frowned upon by the men themselves. A laggard workman is considered by his fellows to be an obstacle in the path to a bonus and they themselves insist that he do his part or get out.

"The first department in which the new plan was tried increased its efficiency four per cent. in the first two weeks. Stimulated by the increased pay which resulted, the department increased its efforts still further until in the last two weeks the increase amounted to 19 per cent. with a resulting 19 per cent. increase in pay.

"In this department a common laborer had been employed as a trucker. It has been his habit to sit down and rest while waiting for a load for his truck. One of the skilled workers explained the bonus plan to him and pointed out what it meant to him personally to utilize every minute of his working time. As a result the skilled worker became a teacher with an eager pupil and the trucker has taken a step up in his work and has doubled his wages."

Trucks Form 21% of Traffic

Maryland has recently prepared a traffic map showing the results of a survey of the highway usage over a period of several years. The work was done by the State Roads Commission of Maryland and mapped by the University of Maryland in coöperation with the United States Bureau of Public Roads.

The counts were made one day per month from 7 A. M. to 7 P. M. extended over the years 1917 to 1920, inclusive. This work is interesting for as our highway expenditures become heavier and the operation of a state highway system a more and more complex problem, the traffic census becomes a necessity for any intelligent study and guide in handling the situation.

How much use do we make of our roads? This question becomes very pertinent when we consider the results shown by this traffic count. In 1917 there were 18,142 passenger cars and 2,596 trucks counted at about fifty stations. In 1918 there were 20,555 passenger cars and 4,593 trucks; in 1919 there were 25,145 passenger cars and 5,273 trucks, and in 1920 there were 31,374 passenger cars and 8,373 trucks.

The question of use becomes important when we compare the increases in character of use over these periods which show conclusively the changing character of road usage from pleasure to commercial purposes.

The increase in the two classes is shown as follows:

	Passenger-Cars.	Trucks.
1918 over 1917	21%	77%
1919 over 1918	21%	15%
1920 over 1919	31%	59%
1920 over 1917	73%	222%

These figures show that the proportional increase is over three times as much for trucks as for passengers cars. In 1917 trucks were 12¼ per cent of the traffic; in 1920, 21 per cent.

Given the number of service units on what character of road is the service most economically rendered? These are but illustrations of a few of the important questions that can only be answered by the aid of a comprehensive traffic census.

B. M. Hall, wholesale manager for the Packard Motor Car Company of Missouri, has been appointed truck sales manager for that concern with headquarters at St. Louis. He succeeds C. A. Bothell.

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Federal for Low Repair Costs

The servicing of motor trucks, according to M. L. Pulcher, president of the Federal Motor Truck Company, is probably the one most important feature of the entire truck business.

"Buyers of trucks buy nothing but transportation," says Mr. Pulcher. "Pride, pleasure and similar considerations affecting passenger-car buyers are entirely lacking in the sale of a truck. Buyers want only one thing—continuous and uninterrupted haulage at a minimum cost."

Acting in this belief, Mr. Pulcher has inaugurated a campaign among Federal dealers based on the slogan, "Keep the Sales Up by Keeping the Up-keep Down."

The Federal company believes, according to Mr. Pulcher, that the owner of a Federal truck is entitled to buy necessary spare parts and to have his truck repaired in a Federal service station by men expert in Federal service work, at a cost as low as, if not lower than, might be obtained in any other garage or shop. Accordingly, the Federal Motor Truck Company has repeatedly lowered the price of spare and replacement parts. These parts, many of them made by the Federal company, can now be bought as cheaply as any of the numerous parts made by the many exclusive spare part makers throughout the country. The company is endeavoring to carry this policy through the service station by requiring its dealers to establish the lowest rate per hour for service work possible under existing labor conditions in various parts of the country. The idea back of the Federal company's service policy is its determination to sell transportation—continuous, uninterrupted and economical haulage—instead of just selling trucks and then forgetting the interests of the buyers.

Mr. Pulcher has met with gratifying and enthusiastic coöperation from the entire service organization in his efforts to "Keep Federal Sales Up by Keeping Federal Upkeep Down." Several Federal dealers have written the factory telling of new truck sales that were traced directly to reasonable charges made for repair and service work.

M. & A. M. A. Export Meeting

World markets for the automotive industry will be discussed at the special export managers' session at the Annual Credit Convention of the Motor & Accessory Manufacturers' Association, September 14, at the Hotel Lafayette, Buffalo. This will be one of the important departmental conferences held in connection with the general association meeting. The tentative program follows:

"Opening Your Eyes to Export Conditions As They Really Are"—By S. W. Dorman, vice president and general manager, Overseas Motor Service Corporation and export manager Klaxon Company, Hyatt Roller Bearing Company and all the other General Motors accessories lines.

"Potential Overseas Markets for the Automotive Industry"—By George Quissenberry.

"Co-Operative Efforts in Automotive Foreign Trade"—By George F. Bauer, secretary, Foreign Trade Committee, National Automobile Chamber of Commerce.

"Lining Up With the Government Program for Promoting International Trade"—By Gordon Lee, chief Automotive Division, Department of Commerce, Washington.

"How We Finance Foreign Trade"—By Glenn Davies, foreign manager, General Motors Acceptance Corporation.

"Problems in Foreign Trade Advertising"—By William F. Earls, advertising department, U. S. Rubber Export Company.

"Packing and Shipping Problems of the Automotive Parts and Accessories Manufacturers"—By a speaker to be announced.

EXPORTS OF MOTOR TRUCKS AND PARTS, MAY, 1922.

Countries.	Gasolene Trucks and Busses: 1 Ton and Less (No.)	1 Ton and Less (Value.)	Over 1 to 2½ Tons. (No.)	Over 1 to 2½ Tons. (Value.)	Over 2½ Tons. (No.)	Over 2½ Tons. (Value.)	Parts. (Value.)
Europe—							
Azores and Madeira Islands	3	$ 1,269	...	.....	..	.....	.....
Belgium	180	48,932	1	$ 1,620	..	.....	$ 9,477
Czechoslovakia	1	364	...	.....	..	.....	597
Denmark	...	.....	2	3,495	..	.....	239,332
Finland	9	2,293	...	.....	..	.....	487
France	...	.....	1	1,620	..	.....	136,866
Germany	...	.....	...	.....	..	.....	1,430
Greece	4	1,616	...	.....	..	.....	16,111
Iceland and Faroe Islands	...	.....	...	.....	..	.....	150
Italy	...	.....	...	.....	..	.....	774
Latvia	...	.....	...	.....	..	.....	339
Malta, Gozo and Cyprus Islands	...	.....	...	.....	..	.....	374
Netherlands	...	.....	...	.....	..	.....	4,083
Norway	60	17,526	...	.....	..	.....	8,706
Portugal	1	404	...	.....	..	.....	4,232
Spain	...	.....	3	3,306	..	.....	39,124
Sweden	303	78,804	4	4,992	..	.....	16,355
Switzerland	...	.....	...	.....	..	.....	804
Turkey in Europe	6	2,064	...	.....	..	.....	6,829
Ukraine	...	.....	5	17,000	..	.....	.....
England	...	.....	10	10,463	..	.....	268,205
Scotland	...	.....	...	.....	..	.....	686
Ireland	...	.....	...	.....	..	.....	3,396
Jugoslavia, Albania, etc	...	.....	...	.....	..	.....	35
North and South America—							
British Honduras	...	.....	...	.....	..	.....	208
Canada	35	26,242	61	83,714	40	$135,293	1,647,090
Costa Rica	...	.....	...	.....	..	.....	887
Guatemala	...	.....	...	.....	..	.....	947
Honduras	1	399	...	.....	..	.....	3,456
Nicaragua	...	.....	...	.....	..	.....	84
Panama	2	688	...	.....	..	.....	5,169
Salvador	...	.....	...	.....	..	.....	1,313
Mexico	111	35,372	14	27,021	..	.....	68,298
Newfoundland and Labrador	...	.....	...	.....	..	.....	1,565
Barbados	...	.....	...	.....	..	.....	896
Jamaica	6	3,824	2	3,138	..	.....	4,509
Trinidad and Tobago	...	.....	3	4,478	..	.....	6,246
Other British West Indies	6	3,020	1	2,200	..	.....	1,997
Cuba	11	3,892	...	.....	1	2,241	64,741
Dominican Republic	1	804	2	5,200	..	.....	5,163
Dutch West Indies	...	.....	...	.....	..	.....	531
French West Indies	...	.....	...	.....	..	.....	2,014
Haiti	...	.....	...	.....	..	.....	2,520
Virgin Islands of U. S.	2	804	...	.....	..	.....	510
Argentina	...	.....	...	.....	..	.....	197,639
Bolivia	...	.....	...	.....	..	.....	535
Brazil	...	.....	...	.....	2	1,888	19,234
Chile	4	1,616	...	.....	..	.....	10,205
Colombia	...	.....	...	.....	..	.....	4,075
Ecuador	2	808	...	.....	..	.....	1,878
British Guiana	...	.....	...	.....	..	.....	1,340
Dutch Guiana	...	.....	1	475	..	.....	184
French Guiana	...	.....	...	.....	..	.....	130
Peru	...	.....	2	2,000	..	.....	3,902
Uruguay	15	6,060	...	.....	..	.....	11,474
Venezuela	2	808	...	.....	..	.....	9,604
Asia—							
Aden	...	.....	...	.....	..	.....	244
Ceylon	...	.....	...	.....	..	.....	1,852
China	...	.....	4	10,250	..	.....	6,019
Kwantung	...	.....	...	.....	..	.....	383
Chosen	...	.....	...	.....	..	.....	1,250
British India	...	.....	...	.....	..	.....	14,005
Straits Settlements	...	.....	...	.....	..	.....	5,246
Other Dutch East Indies	...	.....	...	.....	..	.....	1,724
Java and Madura	...	.....	...	.....	..	.....	3,111
French Indo China	...	.....	...	.....	..	.....	471
Hejaz, Arabia and Mesopotamia	...	.....	...	.....	..	.....	725
Far Eastern Republic	...	.....	...	.....	..	.....	269
Hongkong	...	.....	...	.....	..	.....	2,120
Japan	117	50,319	6	18,815	5	13,335	31,137
Palestine and Syria	...	.....	1	1,500	..	.....	17,965
Philippine Islands	1	750	...	.....	..	.....	42,977
Greece in Asia	...	.....	...	.....	..	.....	57
Siam	..	.....	...	.....	2	4,688	591
Oceania—							
Australia	13	9,958	39	49,225	23	43,553	91,500
New Zealand	4	4,041	4	4,760	4	9,566	22,918
Other British Oceania	...	.....	...	.....	..	.....	1,509
French Oceania	...	.....	...	.....	..	.....	735
Other Oceania	...	.....	...	.....	..	.....	351
Africa—							
Belgian Kongo	16	6,464	...	.....	..	.....	5,664
British West Africa	...	.....	5	4,431	..	.....	12,733
British South Africa	...	.....	8	11,352	9	11,490	44,724
British East Africa	...	.....	...	.....	..	.....	681
Canary Islands	10	4,040	...	.....	..	.....	4,602
French Africa	1	404	...	.....	..	.....	1,740
Egypt	1	404	...	.....	..	.....	1,222
Morocco	...	.....	...	.....	..	.....	1,368
Portuguese Africa	7	3,550	3	1,522	..	.....	2,278
Portuguese East Africa	...	.....	...	.....	..	.....	1,520
Spanish Africa	...	.....	...	.....	..	.....	.....
	935	$317,539	182	$272,577	86	$222,054	$3,160,448

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Fuel Quality Improving

Results of the sixth semi-annual motor gasolene survey, just concluded by the United States Bureau of Mines, indicate that the average gasolene sold in the country is of a better grade than has heretofore been the case. Laboratory tests of motor gasolene sold in New York, Washington, Pittsburgh, Chicago, New Orleans, St. Louis, Denver, Salt Lake City, San Francisco, and Bartlesville, Oklahoma, during the month of July show that this year's gasolene is much more volatile than that sold two years ago, and that it has a somewhat better distillation range than last summer's samples.

Increase in volatility of gasolene means an increase in its rapidity and intensity of explosion. It means also that less carbon residue will be found clogging the cylinders and that starting is easier.

A comparison of the average figures compiled by the Bureau of Mines during the past several years shows that motor gasolene is also becoming more uniform in character. The large seasonal change is disappearing, but "winter gasolene" still has a lower initial boiling point than "summer gasolene." This difference in volatility is made intentionally to facilitate starting the motor in cold weather. The end-point shown in the present survey is slightly lower either than that of last winter or of the summer of 1921.

The average of the entire country considered as a whole does not show much change from a year ago, but samples from individual cities show some distinct changes. Of 132 samples collected by the Bureau of Mines in the present survey 10 failed to meet federal specifications as regards the initial boiling point of 140 degrees F., and 61 samples failed at the 90 per cent. point (374 degrees F.).

Passengers Per 'Bus-Mile

The customary basis of calculating the number of passengers carried per 'bus-mile for the purpose of arriving at itemized motor 'bus operating expenses is incorrect, being founded on a false basis, according to C. Owen Silvers, general manager and engineer of the Wolverhampton Corporation Tramways in England. He states that this figure is usually obtained by dividing the number of tickets issued or fares paid by the number of 'bus-miles run. Taking a simple case in which three tickets are issued covering a 3-mile run he shows that, by the common method of calculation, the result would show one passenger per 'bus-mile, while if those 3 passengers traveled only 1 mile, and were then replaced by 3 more who also traveled 1 mile, and these in turn by 3 more for the last mile, the result would show the correct number of 3 passengers per 'bus-mile.

Instead of this method, Mr. Silvers suggests one that will give more nearly correct results and expresses it in the following formula:

$$\frac{P \times F \times D}{M}$$

in which P is the total number of passengers carried, F is the average fare paid per passenger, D is the average distance in miles for 1 cent, and M is the total mileage.

No City 'Buses for Buffalo

About the time that Mayor Hylan of New York City sent a telegram to Mayor Frank X. Schwab of Buffalo offering the Buffalo mayor "heartiest congratulations" for his success in meeting the strike emergency in that city by the use of 'buses, the Public Service Commission notified Corporation Counsel W. S. Fann of Buffalo that the applications made by the city officials to operate 'buses on the streets could not be granted, as it was contrary to law.

Motor 'buses are being used by 32 electric railways in the eastern part of the United States, and motor 'buses with flanged wheels are being used by 28 short-line steam railroads.

AUTOMOTIVE EXPORTS, JUNE, 1922.

	June. 1921. (No.)	June. 1921. (Value.)	June. 1922. (No.)	June. 1922. (Value.)	Twelve Months Ending June 1921 (No.)	Twelve Months Ending June 1921 (Value.)	Twelve Months Ending June 1922 (No.)	Twelve Months Ending June 1922 (Value.)
Motor Trucks and 'Buses—								
Denmark	1	$ 1,711	.....	.....	74	$ 140,664	5	$ 6,909
Netherlands	35	18,076	2	$ 891	415	392,023	268	166,431
Norway	1	1,862	33	13,810	349	571,656	222	89,982
Spain	....	.....	62	15,428	201	406,461	112	39,690
Sweden	5	3,225	...	.....	488	851,721	382	134,950
United Kingdom	10	12,900	35	44,409	1,560	2,118,157	241	319,316
Canada	55	97,313	156	250,626	1,466	2,630,359	1,099	1,620,355
Mexico	120	131,584	135	65,546	1,629	2,440,897	1,149	692,595
Cuba	22	41,368	11	8,735	1,136	2,951,703	157	102,073
Argentina	....	.....	5	9,218	139	403,727	21	44,287
Brazil	....	.....	...	.....	537	566,985	82	296,595
Peru	....	.....	7	5,280	577	531,034	26	15,051
British East Indies	11	27,512	17	23,153	1,293	2,772,052	96	122,313
China	3	3,765	13	6,220	228	371,724	66	73,587
Dutch East Indies	10	29,390	...	.....	1,163	2,986,463	25	65,282
Japan	68	58,760	86	45,880	770	1,131,320	854	573,966
Philippine Islands	1	200	...	.....	888	1,324,852	29	39,380
Australia	3	9,939	39	62,765	967	1,659,055	542	748,828
British Africa	6	17,354	19	23,003	586	918,064	111	149,311
Other countries	67	76,275	501	211,315	3,132	4,343,038	1,942	1,222,319
Total	418	$ 531,234	1,121	$ 786,279	17,598	$29,511,955	7,429	$6,523,217
Passenger-Cars—								
Belgium	11	17,792	699	257,766	1,051	1,355,278	2,448	1,100,223
Denmark	12	24,670	90	79,331	326	543,385	298	268,685
Netherlands	58	54,285	83	81,485	1,807	2,258,260	571	515,009
Norway	4	3,675	285	124,544	1,462	2,020,176	1,027	412,525
Spain	19	31,066	239	194,238	2,393	3,959,363	778	786,923
Sweden	58	53,347	961	422,820	3,192	4,155,897	2,604	1,461,752
Switzerland	8	13,438	43	52,302	937	1,331,195	325	281,121
United Kingdom	26	37,295	775	576,770	8,205	9,245,837	2,666	2,042,258
Canada	507	703,191	1,807	1,801,822	5,394	7,984,508	8,512	9,137,735
Mexico	600	465,718	563	369,531	6,164	5,140,236	6,573	4,597,273
Cuba	56	59,181	81	106,844	4,559	5,182,786	1,066	982,555
Argentina	4	11,393	113	96,128	2,838	3,985,604	889	925,653
Brazil	....	.....	90	91,507	2,645	3,683,990	477	499,365
Chile	1	1,800	...	.....	329	549,928	26	20,353
Colombia	3	3,354	20	11,189	476	655,536	116	87,158
Peru	3	12,214	2	2,761	665	797,126	40	39,603
Uruguay	...	.....	42	26,583	2,262	2,432,981	168	111,905
British India	40	72,065	92	65,748	6,281	7,693,895	767	699,579
Straits Settlements	1	2,089	...	.....	1,484	1,791,801	24	24,572
China	50	51,516	86	70,766	1,431	1,807,619	408	385,034
Dutch East Indies	3	4,500	43	45,455	3,597	5,309,470	485	585,480
Japan	135	85,879	10	13,178	1,488	1,853,755	1,280	736,307
Philippine Islands	1	600	41	31,040	2,444	3,007,168	271	239,683
Australia	45	59,225	816	658,853	6,260	7,170,657	6,880	5,199,708
New Zealand	11	13,268	59	50,431	3,804	5,017,603	663	632,476
British South Africa	17	13,080	203	177,956	3,227	3,890,365	1,183	1,151,887
Other British Africa	5	6,510	7	10,816	674	836,701	122	120,778
Egypt	23	10,500	2	1,905	836	801,177	321	156,159
Other countries	263	245,839	566	385,457	8,199	9,264,575	3,859	2,940,319
Total	1,964	$2,057,490	7,818	$5,807,226	84,430	$103,786,970	44,747	$36,142,078
Parts of, except engines and tires	.....	2,211,528	18,561,601	4,089,772	.....	67,409,570	.....	33,921,737
Total automobiles and parts of	.....	4,800,252	.....	10,683,277	.....	200,708,495	.....	76,587,032
Tires	.....	758,518	125,353	1,626,861	.....	28,308,166	.....	15,673,092
Automobile engines	542	125,992	8,852	831,401	14,173	2,662,803	33,602	3,955,569

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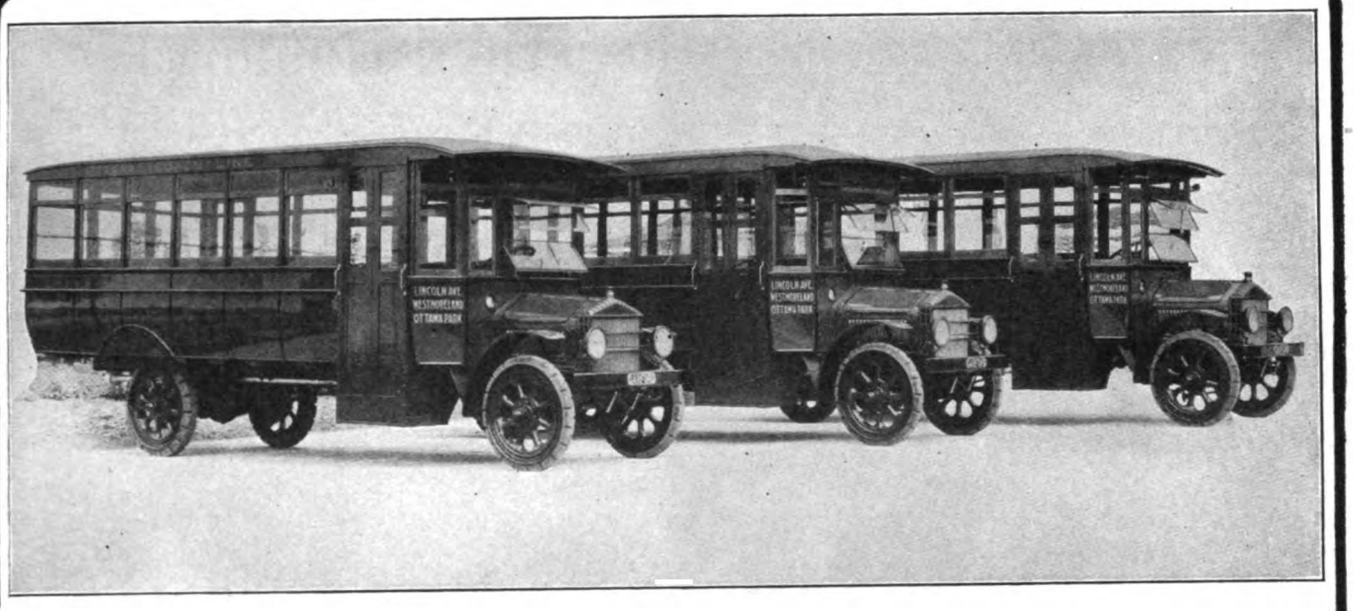

GARFORD

are selling a great many of their Two Ton Trucks equipped with the New Type of Smith Cushion Wheel. Many different bus lines now have their Garford busses equipped with them. All trucks need the New Type of Smith Cushion Wheel just as much as the automobile needs the pneumatic.

Garford has used for years the rigid type of Smith Wheel as standard equipment on their 3½, 5 and 7½ ton trucks.

The Garford Motor Truck Company recognize the Quality and Value of Smith Cushion Wheels.

SMITH WHEEL INC.
SYRACUSE, N.Y. U.S.A.

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White Factory Bonus

The White Motor Company has inaugurated at its factory in Cleveland, Ohio, a bonus system to ultimately affect all factory employees. The bonus is in addition to, and entirely independent of, hourly wages and is not to be confused with the ordinary piece-work plan, from which it differs most materially. The quality of work performed is of prime importance, and only good pieces that pass rigid inspection qualify the worker to earn a bonus.

Briefly, the system embodies the analyzing and classifying of all jobs according to the skill required of the operator. Every job is assigned to one of ten bonus classifications. Standard job and bonus classification charts are posted in the factory and others are in the hands of superintendents, where anyone who wishes may find out what job and bonus class covers his work.

In addition to the job and bonus classification a standard table of fatigue and rest allowances, classified according to the job is adopted; from 10 to 22 per cent allowances are made for fatigue and rest, the most being of course applied to the work which puts the greatest strain on the worker.

When a job has been studied and classified, a bonus chart and instruction card is filled out and given to the worker. The instruction card shows the method by which the work should be done, giving equipment, set-up, total time for each part of the operation, total net time, time allowance for fatigue and the standard time for doing the job.

In order to arrive at the standard job and bonus classification time studies were made by men who formerly had been practical workmen and foremen and who have had from three to five years' time-study experience. At least three time studies are made of each job so that the chance of error is reduced to a minimum.

The bonus chart is set on the standard time of the instruction card for 100 per cent efficiency, but a man begins to earn the bonus when he reaches 60 per cent of the standard and the bonus chart also shows the amount of money which may be earned by increasing the output.

As long as an operation is performed in accordance with the instructions, equipment, method, etc., outlined on the bonus chart and instruction card, the bonus will not be lowered, nor will the standard classification, together with the fatigue and rest allowances, be altered.

This bonus system is an attempt to pay the workers according to their ability. As in the past, an hourly wage is paid to all employees; this is entirely separate and independent of any bonus earnings.

The employee who earns a bonus knows each day just what bonus he earned the day before. Daily the number of pieces he produced is inspected and counted, the time checked and the amount of bonus computed. Then a bonus pay slip is made out showing the amount of bonus earned and this slip is handed to him the day after that particular bonus is earned. The bonus pay envelope contains the total of all the bonus pay slips received by an employee during the preceding day period.

Sausage-Maker Finds Saving in Truck Hauling

By J. STUPKA

Manager, Home Made Sausage Company, Chicago

THE chain restaurants, department stores, and smaller customers that we supply with fancy meats expect prompt delivery of their orders. We have been employing motor trucks in this service for years, and in January, 1920, added a 1¼-ton Garford to our fleet.

Our products are varied, including veal loaf, pork sausage, lard, bacon, smoked tongue, veal sausage, Polish sausage, head cheese, Berliner style sausage, frankfurters, and many other varieties of sausage and smoked meat sold by first-class butchers and delicatessen stores. Our drivers are not salesmen, but simply deliver orders already received at the office.

Our 1¼-ton truck leaves the plant about 7:30 every morning, with a load for our customers in the down-town district. It makes between 17 and 25 stops, delivering to Thompson's restaurants, Messinger's restaurants, and many of the smaller chains of restaurants. These deliveries vary in weight and amount, but our average daily load is about 1½ ton. The truck is back by noon.

In the afternoon the truck goes as far south as South Chicago, taking approximately the same load, and making about 25 stops. It delivers to Lederer's department store and Russell's meat market, two of the largest stores in South Chicago, and also makes numerous stops. This has been the daily work of the truck for the past 11 months, totalling for the 266 days a total of 13,303 miles, or 50 miles daily. Our actual repairs to date have been $64.77 for burnt-out bearings, regrinding the valves, and minor adjustments on the carbureter. The burnt-out bearings were due to carelessness on the part of the driver in inspecting the truck. Our low gasolene mileage is due partly to the congestion of the Chicago down-town district, but more to carbureter trouble.

As we operate seven trucks, we maintain our own garage, and usually take care of all repair work ourselves. With this kind of inspection and care we expect to get 10 years' life out of the 1¼-ton truck, or a minimum of 130,000 miles. It is equipped with pneumatic tires, which we believe will help prolong its life.

For the 11 months ending February 1 this truck averaged 50 miles a day at a cost of $14.40 per day. This includes driver, and an allowance of $250 per year for maintenance and repair. The average cost per mile was 28.8 cents, which we consider very reasonable.

The first of March we took on some new business that will take our trucks a considerable distance from home. On account of the dependable service rendered by our 1¼-ton truck around the city, we decided to use this truck on our out-of-town hauling. The roads to be covered are usually in good shape, and we now have a competent driver who will handle the truck carefully.

On this new work the truck will be averaging 100 miles a day. One day it will go to Aurora, St. Charles and Batavia; another day to Elgin, Joliet, Lockport, and Lamont; another day to Chicago Heights, and the territory around there. This will leave two days for the truck to operate in the city, where we shall be able to find plenty for it to do.

It is probable that we shall decide to operate the truck only five days a week, reserving Saturday for the inspection and minor adjustments which will be necessary after hauling over country roads with the engine continually running. Then, too, as the driver starts out very early in the morning and does not get back until late in the evening, he can hardly be expected to make six such trips a week.

OPERATION.	
Days operated	266
Miles traveled	13,303
Miles per day	50.01
Miles per gallon of gasolene	6⅛
Miles per gallon of oil	172
AVERAGE COST.	
Cost per day (including driver)	$ 14.40
Cost per mile	.2880
Total cost for period	3,831.42
ITEMIZED COST.	
Driver cost per day	$ 5.83
Depreciation per mile	.0148
Maintenance and repair:	
Actual, total	64.77
Actual, per mile	.00486
Estimated, per mile	.0169
Tire cost, estimated, per mile	.0428

6 'Buses for Modesto School

Six large International 'buses were delivered to the high school at Modesto, California, by the Turner Hardware & Implement Company. These new 'buses have a wheel-base of 196 inches and a length over all of 24 feet. They are equipped with 38x7 pneumatic cord truck tires. They are capable of a speed of 35 miles an hour and have a seating capacity of 40 pupils.

The entrance is at the front in direct control of the driver. One large upholstered seat reaches across the rear with smaller seats running crosswise. The body is constructed throughout of hardwood with aluminum bindings. Glass panels on the sides are easily adjustable to meet weather conditions.

The same size channel is used in the frame of the 'bus chassis as on the regular 5-ton International motor truck. It is lengthened as a solid unit, not spliced. This feature also applies to the other parts of the chassis.

The six 'buses have a regular route to cover in picking up the pupils for the Modesto High School and are run on schedule time. There are stations established along the route where the pupils gather at specified times.

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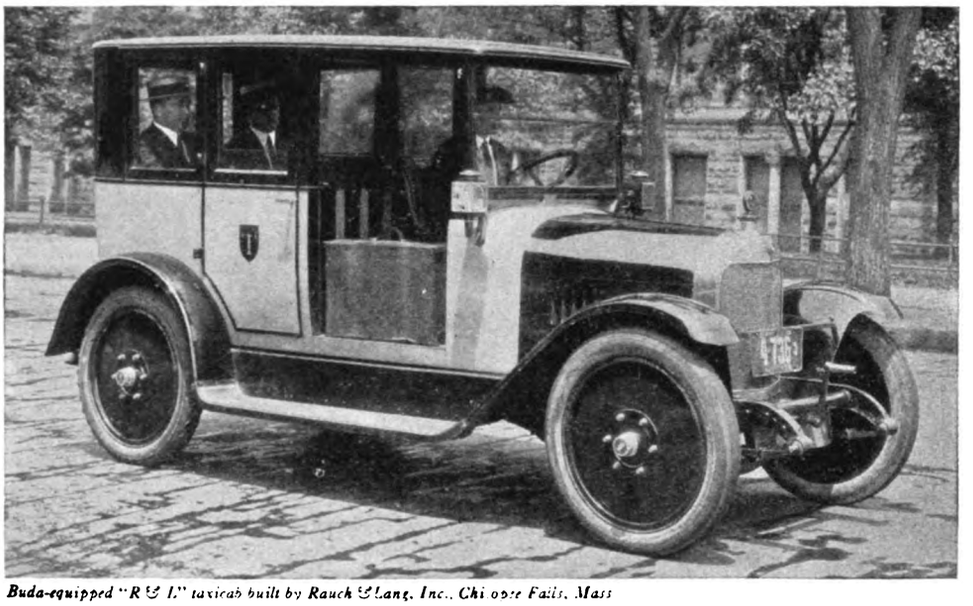
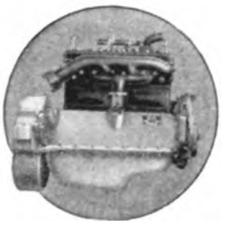


Buda-equipped "R & L" taxicab built by Rauch & Lang, Inc., Chicopee Falls, Mass

Make Buda Power your partner in success



BUILT FOR A PURPOSE

Buda power will help your truck, taxicab or motor coach keep faith with the buyer. The Buda is powerful and sturdy, quiet running and economical. Its every fine quality is the result of years of specialization in the production of heavy-duty engines. The fact that Buda parts service is available all over the country is another important item which helps win and hold sales for Buda-powered vehicles.

THE BUDA COMPANY, HARVEY CHICAGO SUBURB ILL.
ESTABLISHED 1881

BUDA
The
ENGINE

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Effects of Ford Shut Down

Detroit banks and business men appear to be solidly behind Ford in his latest manifesto about closing down September 16. The president of one of the largest banks says: "Ford has not overlooked the advertising value in his announcement, but whatever his motive, be it with an eye on the presidency or otherwise, he has called the turn on profiteering in coal. He knows if the Ford plant stops that half the income streams of Detroit's workingmen will dry up and the effect of his action will be reflected in hundreds of parts accessory manufacturers. Ford could easily pay the 'bootleg' price for coal, and the difference in cost over a year's period would not run over a dollar or two on the million cars turned out. But he is hitting at more than Wall Street. When he speaks of money barons, he means the labor union czar, who is forcing employers to pay for work not performed, and who, in order to keep his own job, is turning industry upside down. As for stoppage of production at the plants, I do not think that will actually occur."

Persons who expect to find behind the Ford plant closing announcement a condition of stagnated car sales comparable to that of January, 1921, when Ford was hard up for money, are likely to be disappointed. He has a record bank balance, a Ford lieutenant says. He also has car orders for September in excess of 125,000. He has already cut off future commitments to such an extent that a possible shutdown September 16 would leave him with a minimum of inventory, a minimum of finished cars on hand and current debts. For example, a lumber company has had cancellations of orders for 3,500,000 feet for September delivery, a body company having orders for daily production of 1,400 bodies has been cut to 400, a spark-plug company which has been supplying Ford on a monthly basis has not been given its October renewal contract, given usually on August 20. A hub cap supplier has had October specifications cut down to one-tenth and had September order cut to one-half. The feeling expressed by one or two manufacturers that Ford would not make good on his alleged bluff is changing to one of more serious consideration of consequences. When the largest automobile material customer goes on a buyer strike, feeling is growing that others can not avoid effects.

Time for Optimism

Babson's report for August 1 says:

"For the first time in over two years we feel justified in talking optimism. From now on we shall be on the home stretch. Although it will be a year or more before we can have prosperity, yet we are all now justified in preparing for it.

"Business depressions are much like a case of measles. In the first stage the main problem is to get the poison, which is the seat of the trouble, out of the system. The patient will itch and fret, but he can not get well until this is done. The seat of the trouble is the economic evils which developed during the preceding period of over-expansion. These depressions are the reaction from the extravagance, reckless management, waste and greed which were bred during the periods of so-called prosperity. The first problem in every depression, therefore, is to correct the evils which caused it. This is why all the 'boost business campaigns' attempted during the past two years have failed. They did not strike at the real cause of the trouble. To urge business expansion while the readjustment process was on, was like urging a patient with the measles to leave his bed while he was still 'breaking out'.

"Now, however, we have reached the turning point in the business outlook. We have passed the halfway mark in the depression period. Experience tells us that by the time this point is reached the worst of the evils which brought on the depression have been corrected.

"This means that clients now can proceed safely to put into operation their plans for development! The conservative and cautious policy which has served so well during the past two years, can now be reversed to one of more aggressive action. Never mind the threats of coal famine or railroad tieup. Remember that fundamental conditions determine business. These conditions now justify gradual improvement. The recovery will be slow, but it will be sure. If you are to take advantage of it, you must make your plans now."

Autocars for Smithsonian Exhibit

The Autocar Company finds particular satisfaction in this its quarter century year because impartial experts at the Smithsonian Institute, in Washington, have requested models of the 5-ton heavy duty Autocar for permanent exhibition in the Smithsonian Transportation Section.

Two quarter-size models have been made at the Autocar factory and will be delivered to the Smithsonian Institution as soon as they have been entirely completed. One with a rack body is a model of the 156-inch wheel base type, while the other is the 120-inch wheel base type. The latter is to be fitted with a complete rotary dump mechanism and body which will elevate and lower exactly the same as in the full size trucks.

All the operations essential in constructing a full-size truck were necessary in the case of these models, beginning with mechanical drawings and patterns and ending with castings and assembling.

Many Tires for Tractors

A new field for both solid and pneumatic tires has been opened by expansion of the use of tractors in the industrial field, Several tire companies are already doing a comparatively large business in solid tires for Fordson tractors and others plan to enter this field. Fordson tractors were pressed into industrial service when Ford dealers who were required to take a certain number with their regular car orders found it impossible to sell to farmers and turned to industrial possibilities. Tractors were found to be practicable for a large variety of purposes, but the regular steel rim or wheel was impracticable, so rubber tires were substituted.

Why the Public Rides 'Buses

Electric railway men have shown their appreciation of the motor 'bus's advantages in a recent issue of the organ of the American Electric Railway Association. In referring to a remark made by a motor 'bus man at one of the association meetings, in which he attributed the increasing use of motor 'buses to the public's desire to "ride on rubber" or "the rubber urge," a writer says:

"We feel that the gentleman did not state the real reason why some people like to ride in 'buses or 'jitneys.' It is not that they want to 'ride on rubber,' but that they want to get to work and home from work in the shortest possible time. There is nothing that jounces one so thoroughly as a big motor truck in city service, even on the smoothest highway. But the people are willing to ride under uncomfortable conditions because the 'bus draws up to the curb, takes them aboard and gets them quickly to wherever they are going.

"The public is in a hurry; it is irritated by slow service. When a man who wants to go somewhere stands in the middle of the highway and waits for a car whose crew is dawdling along, he mutters imprecations, and he is ready for a 'bus ride. He doesn't care particularly whether the 'bus has rubber tires or wooden ones—what he wants is to be on his way. Of course, if the trolley cars are not attractive, clean, or running at frequent intervals, he will ride the 'buses anyway."

As far as it goes this is a pretty fair statement of the motor vehicle's advantages from the public's point of view and until street-railway men devise some method of placing the same desirable features at the disposal of street-car riders motor 'buses may be expected to take an ever-increasing share of patronage from the rail lines. In traffic congestion a street-car is about the slowest thing moving, even slower than the pedestrians on a crowded sidewalk and almost as slow as horse-drawn wagons.

CLASSIFIED ADVERTISING

WANTED

An intelligent, experienced man to take charge of the distribution and retail sales of one of the best known trucks in America, manufactured now for more than twenty years. Must be absolutely honest and capable of handling a high-grade product.

To such a man we offer a good, permanent position with salary, a commission and a bonus. Position will pay from $5,000 to $15,000 a year, according to business conditions and the number of trucks sold.

An excellent service department, a fine business organization and hundreds of satisfied owners in the heart of a manufacturing district will assist this man to "make good."

All replies will be considered confidential and answered as soon as possible.

Please give experience. Address G K 45, POWER WAGON.

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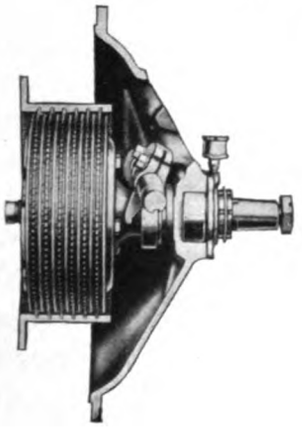
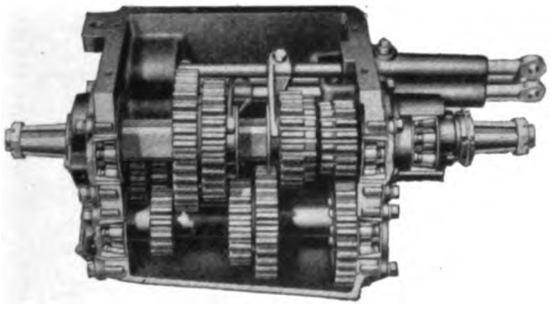


Meets Requirements of Foreign Service

IN building American trucks for use abroad, be sure to select units that require a minimum of replacement.



Brown-Lipe Gear Transmissions, clutches, and control sets are as sturdy and as unlikely to need replacements as the highest type of engineering skill, workmanship, and carefully selected materials can make them.

In case of accidental injury, genuine replacement parts are quickly obtainable and they always fit.

BROWN-LIPE-GEAR
TRANSMISSIONS

BROWN-LIPE-CHAPIN
DIFFERENTIALS

Both at Syracuse, N.Y.

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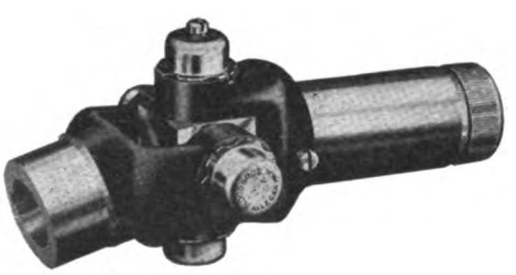
Greater power isn't enough. The parts of a truck must be made to stand the strain that greater power imposes. The power of Pierce-Arrow's dual-valve engine is translated into delivery service without the least suggestion of stress or strain.

Pierce-Arrow
TRUCKS

The Pierce-Arrow Motor Car Company
Buffalo, New York

2-ton $3200 3½-ton $4350 5-ton $4850 fully equipped

BLOOD-BROTHERS
Oil Lubricated
Universal Joints



"STAY PUT"

More than thirty-five leading automobile truck and tractor manufacturers have definitely solved their universal joint problems by using this trouble proof joint as standard equipment. It will pay you to
INVESTIGATE

Blood-Brothers Machine Co.
Pioneer Builders of Universal Joints
ALLEGAN P. Somers Peterson Co. San Francisco, Cal Western Representative MICHIGAN

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Wood Hydraulic Hoist & Body Company, Detroit.

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International Motor Company, New York.
Pierce-Arrow Motor Car Company, Buffalo.

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Gar Wood Says:

"Nine-tenths of the country's truck owners say that the synonym for good hoist is Wood hoists."

Gar Wood

Built by "Gar Wood"

Wherever Trucks Are Used—

Here or abroad, nine out of every ten trucks that are equipped with hoists—in municipal work, cartage work or industrial work—are using

WOOD DETROIT

Hydraulic Hoists and Steel Bodies

Nine out of every ten trucks are using equipment that will function right under every condition and assure quick, clean dumping on any job.

Wood-Detroit Hoists and Wood-Detroit Bodies are made for every kind of work. Wood Engineers, working with truck makers, have developed the line to cover all branches of industry requiring proven dumping trucks.

Tell us the size and make of your truck and the commodity you handle—and we will tell you about the equipment that fits your requirements.

Wood Hydraulic Hoist & Body Company

7924 Riopelle St. Detroit, Mich.

Sales and Service in all principal cities.

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"PERFORMANCE COUNTS"

What Really Sells Motor Trucks?

Mack TRUCKS

Capacities:
1 1-2 to 7 1-2 tons
Tractors to 15 tons

THE personal element is still, and always will be, a big factor in the selling of any product. And motor trucks are no exception.

But no matter how high a salesman may stand in the esteem of the buyer, unless he has a background of a profit earning truck he cannot hope to secure and hold his customers in the face of keen competition. The quality of the truck, its past record, its prestige and the organization behind it all figure prominently in the permanent success of the individual representative.

This company has an unsurpassed selling organization, every last member of which is enthusiastic about the Mack product because of its established reputation. We are always glad to place additional dealers of the right calibre. There is still good territory available.

Inquiries are always welcome. *Now* is a good time to write!

INTERNATIONAL MOTOR COMPANY
25 Broadway New York City

Branches owned by this company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION"

Please mention "Power Wagon" when writing to advertisers

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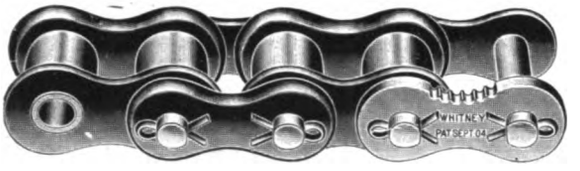
Investigate LATEST "WHITNEY"



LATEST ROLLER CHAINS HAVE SPECIAL QUALITY
SOLID ROLLS AND OTHER IMPORTANT IMPROVEMENTS

HIGH EFFICIENCY
ROLLER AND SILENT TYPE
CHAINS
also ***Low*** Cost per ***Thousand Miles*** of Service

Front End Motor Chain Drives

EXCEPTIONAL MILEAGE AND NEVER KNOWN TO SKIP THE SPROCKET TEETH

THE WHITNEY MFG. CO.
HARTFORD, CONNECTICUT, U. S. A.

Road Building Fleets

This fleet of twenty 3-ton trucks equipped with Heil Bodies and Hoists is considered the best equipped fleet engaged in road work in Minnesota this season.

The bodies are Model SSC, each fitted with double acting tail gate, a gravel spreading device and sliding bottom in the floor so that wet concrete will dump out easily.

A long stroke No. 4 Hydro Hoist is used to dump the load which takes from 15 to 30 seconds. The Hoist is direct acting, all the power being delivered at the right place.

DEALERS: You will find a very satisfactory margin in selling Heil Equipment. Write for prices and discounts.

THE HEIL CO.
1140 Montana Ave. **Milwaukee, Wis.**
Distributors—Chicago, New York, San Francisco, St. Paul, Cleveland, Richmond, Pittsburgh, Washington, D. C., Sioux City, Ia.

DENBY
MOTOR TRUCKS

Model 33, 1½-2 Ton Bus

Operated by

STAR TRANSPORTATION COMPANY
MASON CITY, IOWA

SWIFT - ECONOMICAL - POWERFUL

Denby Motor Truck Company
DETROIT, U. S. A.

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Lee Automatic Dump Body

DUMPS WITHOUT POWER

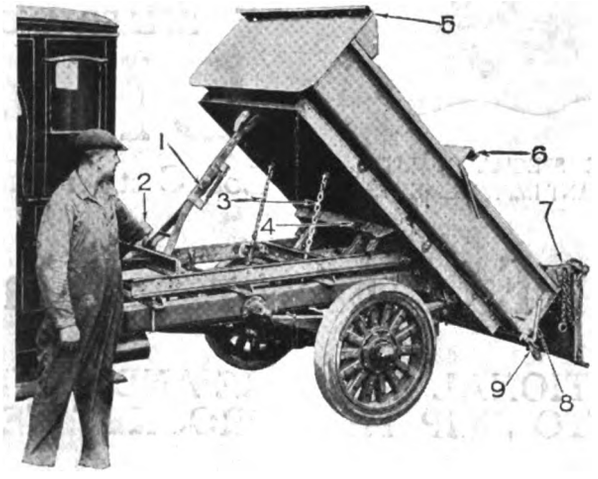
1 **Folding Standard** — automatically locks body in dumping position.

2 **Control Lever**—automatically locks body in traveling position.

3 **Check Chains**—Prevent malalignment of body on uneven ground.

4 **Roller Segment** — rolls on a low track, giving low overall height.

5 **High Dumping Angle**—moves the stickiest material quickly.



6 **Partition**—divides the load for multiple batch hauling. ($25 extra).

7 **Spreader**—lays gravel, stone, etc., evenly and efficiently.

8 **Gate Control** -- affords automatic and manual operation.

9 **Lowest Dumping Point** — gives ample ground clearance.

ELIMINATE TRUCK TROUBLES

LEE BODIES eliminate half the total troubles of a dump truck, as it does not use a HOIST with its numerous complicated parts that are subject to improper installation, adjustments and wear, road shocks, vibrations, exposure to dirt, dust, weather, etc., etc.

INCREASE DAILY TONNAGE

The conventional type of mechanical-operated dumping body is a highly complicated mechanism, high in first cost, high in selling price, and high in up-keep expense, and the very quality that makes its production cost unnecessarily high—its great and needless complexity of construction—is the quality that makes it undependable, liable to frequent service interruptions and a source of lasting grief to buyer and seller alike.

SAVE ON FIRST COST

By eliminating the complications inherent in power-operated dumping bodies, an economy in first cost of about 40% has been made possible, while every advantage of these types has been retained without their disadvantages — costs of maintenance and loss of time for repairs, excessive weight and unnecessary high price.

LEE TRAILER AND BODY COMPANY, 2343 S. La Salle Street, Chicago, Ill., U. S. A.

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POWER WAGON

NUMBER 215 CHICAGO, OCTOBER, 1922 Price 25 Cents

Back of every perfected achievement of man—
SPECIALIZATION

ROOSEVELT DAM — Greatest work of the United States Reclamation Service. Salt River, Ariz. Reservoir contains 61,000,000,000 cubic feet of water. Dam measures 284 feet high, 170 feet thick at base, and 1080 feet wide.

Progress toward perfection —the SPECIALIZED truck

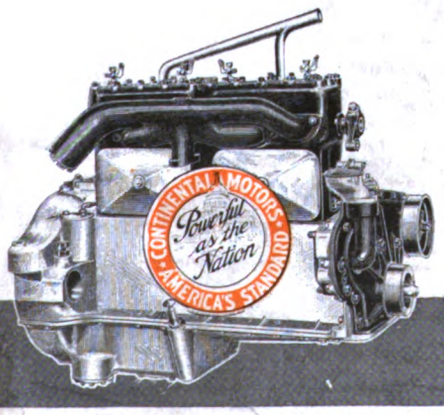
The exacting demands to be put upon the Roosevelt Dam necessitated its construction by co-ordinated efforts of many specialist organizations, each contributing an essential factor to the finished undertaking.

The exacting demands upon present day trucks counsel that each performing unit shall be the product of an organization of specialists.

The SPECIALIZED truck meets the demands made upon it through the perfection of its major units. Motor, transmission, universal joints, axles, clutch, etc., are all the products of the leading SPECIALIZED unit manufacturers of the automotive industry.

Back of your truck if it is a SPECIALIZED vehicle, are the multiplied reputations of all the unit manufacturers. Back of your truck are parts-distributing stations throughout the world. Back of your truck is the public's demand for SPECIALIZED vehicles.

The first assurance of importance to make in considering the SPECIALIZED vehicle is that upon the crankcase of the motor is the leading symbol of SPECIALIZATION—the Continental Red Seal.



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Largest Exclusive Motor Manufacturers in the World

Continental Motors

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Strom Bearings Play an Important Part in the Automotive Industry

THE rapidly growing appreciation of the superior qualities of Strom Bearings is best evidenced by the increasing numbers of fine cars and trucks that use them as standard equipment.

The listing of these names would form a select blue book of the automotive industry.

And it is only after the most rigid tests of all makes of bearings that they have selected Strom Bearings as meeting most exactly every requirement.

Outstanding among the points that appeal to such manufacturers are the established correctness of design, the extreme accuracy of workmanship and the unfailing high quality of materials characteristic of Strom Bearings.

Then, too, the fact that they are made in a wide range of styles and sizes is an added feature in the selection of the **right** type for a particular duty.

Our corps of engineers will be glad to serve you and we should like to send you our catalog and price list.

U. S. BALL BEARING MFG. CO.
(Conrad Patent Licensee)

4541 Palmer Street **Chicago, Illinois**

Double-row, maximum type, radial bearing

Double-acting, self-aligning thrust bearing. 2100 Series

Double-acting, self-aligning thrust bearing with leveling washers. 2100-U Series

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Angular contact bearing —combination radial and thrust

Single-row, maximum type, radial bearing

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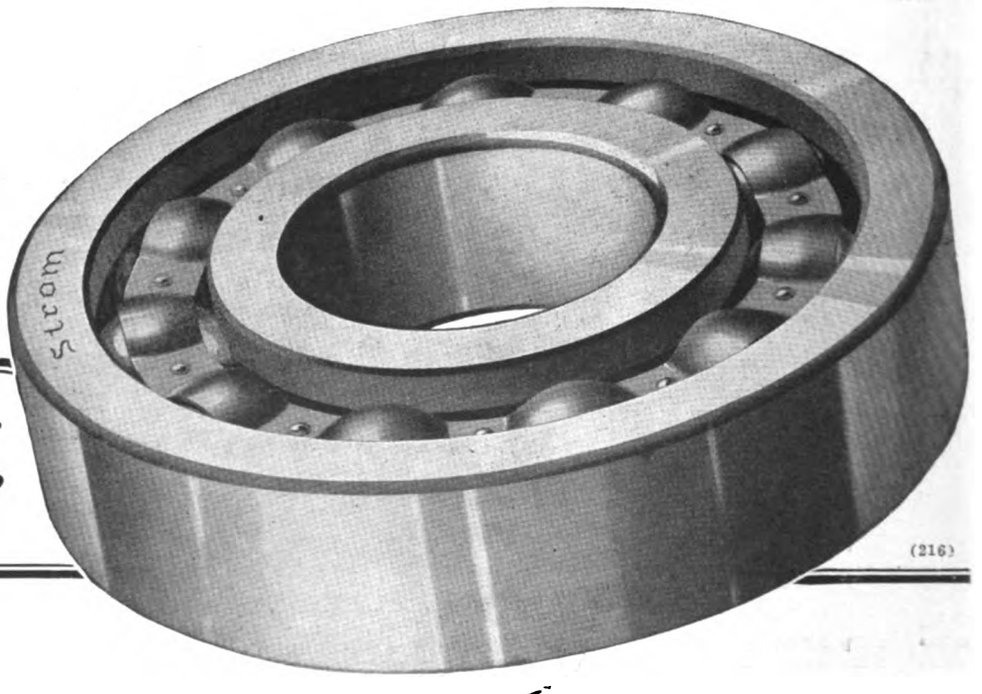

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The success of any motor truck dealership depends as much upon the facilities for maintaining the trucks in service, as it does upon their quality.

GMC Trucks are distributed in every section of the country either by direct factory branches or by authorized distributors. In either case their continued and successful performance is safeguarded by large and inclusive supplies of replacements, located at the distributing points.

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Division of General Motors Corporation

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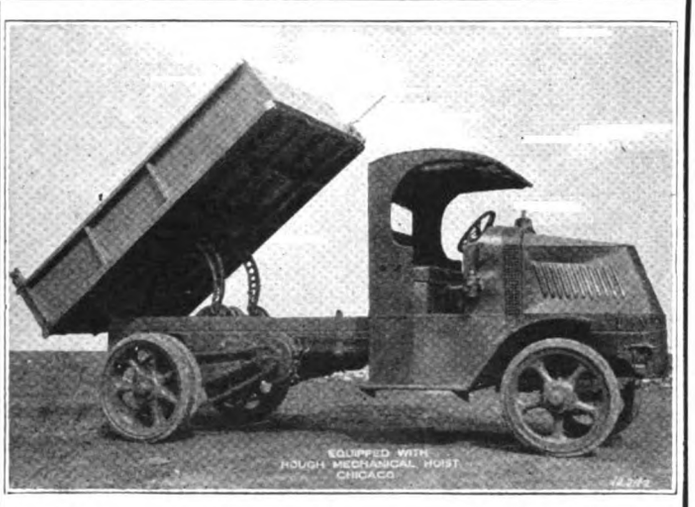

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installations become an integral part of your truck unit, carrying out the same principle of delivering the power of your motor in elevating the body through a positive gear drive identical with your own truck transmission. There being **no** oil cylinders, check valves or oil pumps. Nothing to be affected by dirt or grit, **no** valves to leak, **no** packing to become loose.

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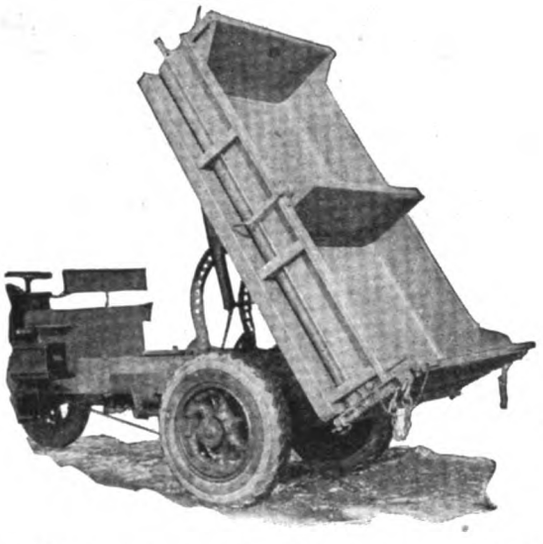

The high dumping angle designed for road building units is an exclusive feature with Hough Hoists.

Built in three sizes, fits any make of truck.

3 Ton — 6 Ton — 10 Ton

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

Published monthly by

THE POWER WAGON PUBLISHING COMPANY

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THE POWER WAGON PUBLISHING COMPANY

WALTER WARDROP, *President and General Manager*
STANLEY A. PHILLIPS, *Vice-President and Editor*

Executive and Editorial Offices, 544 Lake Shore Drive, Chicago.

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One Hundred Million Dollars

Eleven years ago The Pierce-Arrow Motor Truck Company built and sold 50 trucks. The performance of those original Pierce-Arrow Trucks is a matter of definite scientific record. Forty-four are in active service today.* The reward for building so well—for furnishing such extremely low cost transportation service—is seen in the fact that more than $100,000,000.00 worth of Pierce-Arrow Trucks have since been built and sold. The Pierce-Arrow dealer franchise becomes more valuable each year. Some interesting information is available for dealers in territories where we are not now represented.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, New York

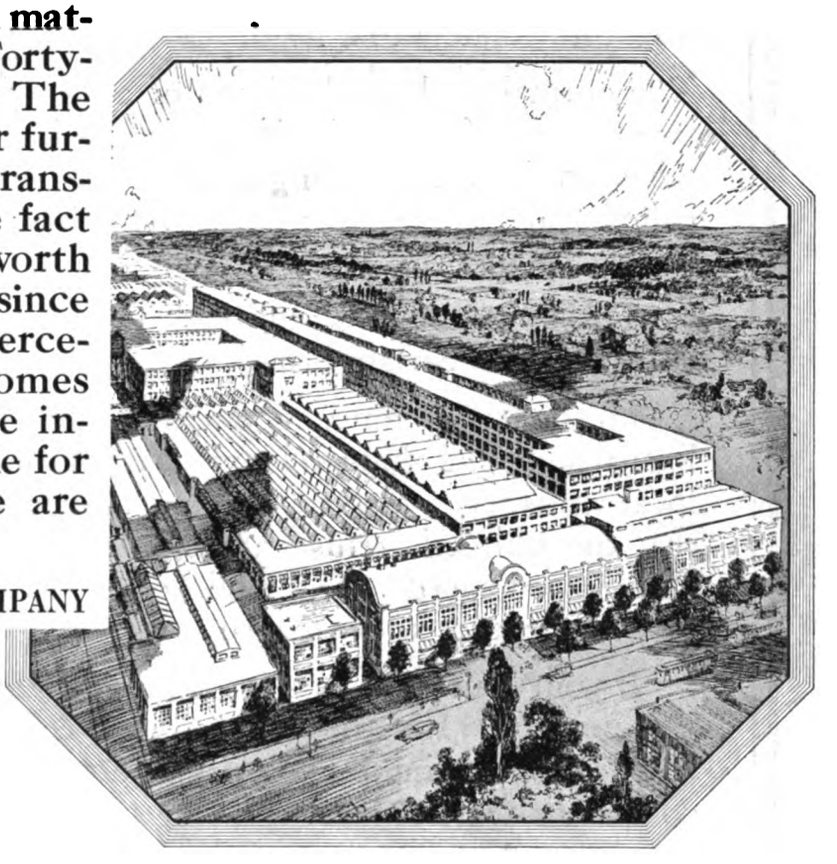
*Of the original 50 Pierce-Arrow Trucks built in 1911, two are retired from service; two are unaccounted for; and two were destroyed by fire

Chassis Prices:

2-Ton	$3,200
3½-Ton	4,350
5-Ton	4,850

F. . B. Buffalo

The Pierce-Arrow Plant occupies 88½ acres and contains 1,500,000 sq. ft. of floor space.



Pierce Arrow

MOTOR TRUCKS

WORM-DRIVE DUAL-VALVE

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Are you ready to help clear the way

THE settlement of the coal strike will bring the transportation crisis immediately to a head.

The normal coal car loadings of an entire summer must be crowded into the next few weeks if we are to keep our homes warm and the wheels of industry moving this winter. In addition, the railroads will be called upon to transport bumper crops and a bigger volume of general business than last year.

This acute strain on railroad transportation will undoubtedly force embargoes on certain classes of freight—particularly short haul freight.

Motor trucks must accomplish more than ever. Dealers must deliver many split shipments of coal. Consumers must haul coal from local yards when dealers are too rushed to deliver. Any short hauls that the railroads refuse must be made. Terminals must be cleared with record speed. The strain on available rolling stock must be relieved whenever and wherever possible.

If your trucks need overhauling, make arrangements *at once* for that purpose. If you need additional equipment, buy it *now*. Even if you are contracting for your transportation, make sure that your hauling contractor realizes what is facing him.

Many men whose business would otherwise be tied up will be able to get coal and make short haul shipments if they own trucks.

THE AUTOCAR COMPANY, Ardmore, Pa., Established 1897
Manufacturers of the Autocar Motor Truck

Carrying capacities, 1 to 6 tons
Chassis prices, $1100 to $4100

A motor truck is only as good as the service behind it

Autocar

Wherever there's a road

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POWER WAGON

Vol. XXIX. CHICAGO, OCTOBER, 1922. No. 215.

Trucks Registered July 1 Total 1,096,605 for U. S.

INCREASE THRICE AS FAST AS CARS

That the business of the nation is turning more and more to highway transportation is indicated by statistics on motor vehicle registration as of July 1, compiled by the Bureau of Public Roads of the United States Department of Agriculture. Registration of passenger-cars, taxis, 'buses, and motor trucks totaled 10,620,471 on this date, an increase of 157,176, which is a healthy growth, as the first half of the year is the off season for registration of new vehicles.

The surprising fact, however, is that of the 157,174 increase in registration motor trucks constituted 116,701, against 35,030 passenger-cars and 5,443 taxis and 'buses. This means an increase of over 16 per cent. of the number of motor trucks at the beginning of the year. Figures are not available to show what part of the increase of 5,443, or nearly 11 per cent., in the taxi and 'bus registration is due to the increase in the number of 'buses traversing rural and suburban routes, but it is very probable that a considerable part of the increase is due to the development of this new form of transportation.

It has been frequently said that the traffic is always ready and waiting when good roads are built, and that the commercial motor vehicle as a class is more handicapped by lack of good roads than the pleasure vehicle. The increase in the registration of motor trucks, coupled with the present activity in highway construction, seems to bear out this statement in the opinion of department officials.

The table of statistics issued by the bureau shows a registration of 9,467,874 private cars, 55,900 taxis and 'buses, and 1,096,605 motor trucks, making a total of 10,620,471. Motor-cycles are not included, there being 149,924 against 196,231 at the beginning of the year.

Truck Output Growing

Figures received by the Department of Commerce show a considerable increase in the production of both motor trucks and passenger automobiles in August. The total production of passenger-cars in August was 246,941, compared with 224,057 in July, while truck production in August amounted to 24,064, as against 21,357 in July. In both cases the August total exceeds any other month this year except June.

The following table gives the revised figures of total production for the last eight months by all companies whose reports have been received. With a few exceptions, the reports each month are from identical firms and include approximately 90 passenger-car and 80 truck manufacturers. August figures are subject to slight revision when all reports have been received.

1922.	Trucks.	Passenger-cars.
January	9,416	81,693
February	13,195	109,171
March	19,761	152,959
April	22,342	197,216
May	23,788	232,431
June	25,984	263,027
July	21,357	224,057
August	24,064	246,941
Total (7 months)	159,907	1,507,495

$600,000,000 for Roads Last Year

A total of $600,000,000 was spent for construction and maintenance of highways in the United States during 1921, according to figures compiled by the Bureau of Public Works, United States Department of Agriculture. Of this sum local road bond issues accounted for 33 per cent. of the total. Motor vehicle revenue added 19 per cent. more. The United States government, under the federal aid act, gave 14 per cent., while county, township and district taxes and assessments secured an equal amount. State taxes and appropriations added 12 per cent., while state road bonds amounted to 7 per cent. of the total. It is interesting to note the position of state road bonds in the table. A vast amount of publicity was given to the state bond issues, and yet they totaled only 7 per cent. of the money spent in 1921.

Truck Price Changes

The following changes in the list prices of truck chassis have been made since the date of the last list published in these columns:

Truck.	Old Price.	New Price.
Gary, 1 -ton	$1,675	$1,775
Gary, 2 -ton	2,250	2,450
Gary, 2½-ton	2,650	2,850
Gary, 3½-ton	3,650	3,790
Gary, 5 -ton	4,100	4,450
Hawkeye, 1 -ton	1,500	1,375
Hawkeye, 1½-ton	1,850	1,645
Hawkeye, 2 -ton	2,650	2,145
Signal, 1 -ton	1,950	1,450
Signal, 1½-ton	2,450	1,950
Signal, 2½-ton	2,875	2,375
Signal, 3½-ton	3,675	3,175
Signal, 5 -ton	4,400	3,900

Would Limit Truck Weight

The California legislature will soon be asked to consider and pass a bill which provides for a gasolene tax of 2 cents a gallon, a weight limit of 22,000 pounds for laden motor trucks and a graduated weight tax on all kinds of automotive vehicles, all in addition to the present license fee based on horse-power.

Chicago Will Have World's Finest Motor 'Bus Service

HERTZ, OF YELLOW CAB FAME, AT HEAD

A public motor 'bus service in Chicago, designed to establish a new world standard in its transportation field, made its bow recently with announcement by John Hertz, president of the Yellow Cab Company, of a $3,000,000 concern which is to extend regular 'bus service to every boulevard and residence district of the city.

The corporation, headed by Mr. Hertz and Charles A. McCulloch of the Parmelee Company, has already taken over all properties of the Chicago Motor 'Bus Company, has ordered all but six of the newest vehicles now in use on north side boulevards junked, and plans to build scores of ultra modern vehicles to be routed over all three of the Chicago park boulevard systems. Word went out that the company is prepared to meet all competition in obtaining services of the world's best transportation experts.

Establishment of new routes through the south and west sides will begin as soon as the Illinois Commerce Commission issues operating certificates and franchises can be had from the city, south park and west park boards, Mr. Hertz announced. The commerce commission has promised to reopen its hearings on the original petition to extend Chicago 'bus lines over new city routes on October 10. It is understood that the park boards are ready to grant permission for use of the boulevards when the responsibility of the reorganized company is established.

"This venture is primarily aimed at civic advancement," declared Mr. Hertz, "and the fun of creating a service which will surpass any of its kind in the world. The investment will be necessarily heavy, and we hope that the service can be made eventually to pay for itself, but our first object will be to show the world that 'bus service in Chicago can be brought to the highest standard ever dreamed of in public motor transportation. I have just returned from an inspection of public conveyances in Europe and I know that we can top anything they have over there.

"The 10 cent fare will be continued until such time as the increased operating revenue we expect has made it financially possible to reduce the rates. In talking the plan over with Mayor Thompson, I made it plain that we will bring down the fare if it is financially possible. It is our idea

(*Continued on page* 10.)

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Automotive Makers Must Remain Conservative Still

PLANT EXPANSION NOT YET WARRANTED

"It is high time to escape from the economic psychology of war," said Merryle S. Rukeyser, speaking before the convention of the Motor and Accessory Manufacturers' Association. "While the nation was mobilized for a single purpose, the essential character of every economic thing was tested by its effect on gaining the nation's immediate objective. Pleasure cars, during the emergency, were more or less taboo. But the emergency is over and the taboo should be forgotten.

"Railroad executives are not unmindful of the expanding possibilities for competition from motor trucks and are seriously discussing the means of meeting the new situation. I think it would be futile for railway executives to seek to combat the motor truck. It is an instrument for usefulness whose worth is being increasingly recognized. It can be made to facilitate transportation over steam-railway lines by taking over short hauls and by relieving congestion at necks of bottles, such as New York.

"Incidentally, the comparative lack of regulation suggests one of the main assets of the automotive industry. It has successfully kept itself out of national politics. Being newer, it has grown up in a different spirit from that prevailing some ninety years ago, when the pioneers of railway transportation first laid their plans. The leaders of the automobile industry understood that their profit lay in serving the farmer, for example, not antagonizing him.

"There is no political capital in swatting the automobile industry, as there has been in restricting the field of free endeavor for railroad men. The automobile industry would lose its favored position if competition should be followed up closely and if public service faltered.

"Unlike many of the older industries, the automotive is one of progressivism. There are no conservative leaders, in the sense of the precedent hounds. It is necessarily an industry of drastic change and incessant experimentation. The goad of competition is perpetually driving the pilots of the industry to discover means of more efficient use of fuels, greater simplicity of design, and heightened comfort for passengers.

"As for the outlook, next year's automobile business ought to be satisfactory. In all respects but one, the factors which can be foreseen, must be placed on the asset side. The one exception is the fact that part of the 1922 buying was due to the accumulated demand which had become pent up during the depression of the latter part of 1920 and of 1921.

"On the side of favorable influences, most of them can be expressed in the phrase—better general financial and industrial conditions. It does not take a fortune-teller nor a soothsayer to know that business is on the up-grade.

"Up to the present, the improvement, broadly speaking, has been principally in the physical volume of trade, in the increased employment of labor, in more or less stabilization of prices, and particularly in the complete disappearance of the panicky feeling which led men of business to do foolish and unnecessary things in the end of 1920.

"Despite these enormous gains, there has not yet been, broadly speaking, especially profitable business in most lines this year. The aftermath of depression has left the business world highly competitive with many units fighting doggedly for trade, often at the expense of profits. This narrowing of the margin of profits will no doubt, in some of the less favored industries, result in a secondary wave of bankruptcies among the weaker and less efficient producers.

"Unless we are wise enough to escape wholly from the experiences of the past, after the prosperity will come a crisis and a depression. Serious setbacks two years or so hence can be obviated by those in control of business who remain aware of the traditional tendency of trade currents to ebb and flow.

"Business, especially one like the automotive industry which depends on mass production and upon the simultaneity of production of hundreds of parts makers, can not thrive, of course, on hunches and intuitions. The decisions of modern business must be based on an unending flow of essential facts."

Republic Receiver Appointed

The appointment of Security Trust Company of Detroit, as receiver for the Republic Motor Truck Company, Inc., made by Judge Tuttle of the federal court at Detroit, was with the concurrence of the company and its largest creditors and is a step necessary in connection with the carrying out of a plan of reorganization. The business of the company will be continued with Mr. Smith in charge of operations, and the details of the proposed plan of reorganization will be made public as soon as practicable.

The Republic Truck Sales Corporation is in no way affected by the receivership of the parent company, and will continue to handle its business as previously, in charge of the same management.

Stringent 'Bus Regulations

The village council of Kirkersville, Ohio, has passed an ordinance requiring that owners of motor 'buses operating in or through the village must pay an annual license fee of $200 for each machine and furnish bonds of $10,000 for each 'bus seating 4 or fewer passengers, of $25,000 for each 'bus seating from 4 to 6 passengers, and of $50,000 for each 'bus seating more than 6 people.

Master in Difficulties

Master Trucks, Inc., is the defendant in a suit in bankruptcy filed by the Maremont Manufacturing Company, the Up-To-Date Machine Company and the Auto Body Company, all of Chicago, for claims aggregating $750,000 for goods delivered. The petitioners claim that the Master organization showed preference to creditors by favoring the Vacuum Oil Company with a $500 payment recently.

Preferred Coal Consumers Removed from I. C. C. List

AUTOMOTIVE INDUSTRY WILL BENEFIT

The motor industry is not placed in the preferred class by modification of the Interstate Commerce Commission's service order No. 23, but the modification of this order will materially increase the ease with which Henry Ford and other motor manufacturers may obtain coal, by permitting carriers to supply them with coal without first taking care of the needs of the preferred class of consumers.

Under the provisions of Service Order 23 carriers, in supplying cars to mines, were directed to furnish cars for the loading of coal to certain classes of consumers only. The motor industry was not included in any of these classes. Now, however, as the production of bituminous coal has increased to approximately 9,500,000 tons a week, and should, with reasonable use, take care of current needs, the commission, in Service Order No. 25, has omitted this preferred class of consumers, reserving the right, however, in special cases of great emergency, to direct carriers to furnish any coal mine with such open top cars as may, in the public interest, from time to time be designated by it.

In addition to omitting these general priorities by classes of consumers, the modification of Service Order 23 adds to the list of commodities to be given preference and priority in movement, when carriers are unable to move all freight offered. This list now includes food for human consumption, feed for live-stock, perishable products, coal, coke, other fuels, mine supplies, medicines, fertilizers, seeds, newsprint paper, petroleum and its product.

It is unofficially stated at the Interstate Commerce Commission that the commission will not make any reply to Ford's charges that it is playing into the hands of coal profiteers by its allotment of cars; also that there is not much chance that the commission will make a further modification of its priority order placing the motor industry on the preferred list. It is said it is not likely that priorities will be lifted soon. It is explained that the country is now in the season when crops are moving, and even in normal times there is congestion of traffic on practically all lines.

"Wolverine" in Bankruptcy

American Commercial Car Company, Detroit, petitioned in bankruptcy on September 19. The petition stated that it was the wish of the concern to dissolve "there being no prospect of making sufficient profits to warrant continuing in business." The Security Trust Company was named receiver.

W. D. Woodworth who was with the Packard Motor Car Company for seven years and who for the past seven years has been the general manager of the Wood Hydraulic Hoist & Body Company, Detroit, has resigned to become the general manager of the Maccar Truck Company, Scranton, Pennsylvania.

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Make the Traffic Pay for Road Upkeep Says Terrace

"FUEL TAX EASY AND CHEAP METHOD"

President Frank Terrace, speaking before the twenty-third annual convention of the Washington State Good Roads Association at Ellensburg, Washington, recently, said:

"The legitimate function of a highway is, first, the accommodation of private owners of vehicles for their individual pleasure and business. They are not designed or intended as permanent roadbeds for transportation business, and can never be depended upon to fulfill that function. We have not yet developed a roadbed which will stand the everlasting pounding of this traffic for which highways were never intended. Roads that were designed and built honestly for 95 per cent. of the traffic have been hammered to pieces by 5 per cent. of the traffic.

"The early destruction of many of our highways has called for rebuilding on a far more expensive scale, and for all new highways to be designed for the heaviest traffic, which is only 5 per cent. Are we to continue this expensive construction and maintenance to provide a practically free right of way roadbed and maintain it for a traffic which pays nothing for its use except a simple license, the same as any ordinary pleasure vehicle

"It is generally conceded that a highway capable of standing the legitimate 95 per cent. of travel can be built for $30,000 per mile (16-foot road). If this abnormal traffic is to be perpetuated, we must pay at least $50,000 per mile, an extra $20,000 per mile for 5 per cent. of the travel. Are we going to stand for this—to make and maintain such roads for traffic never contemplated, which can not take the place of railroads, and only serve to bankrupt them?

"Electric and steam railroads are absolutely the only safe, sane and permanent means of commercial traffic; and no country can prosper without them. Their rights of way must be bought, tunnels and cuts made, bridges and culverts built, tracks laid, engines and cars bought, and all kinds of buildings erected at enormous cost to operate this essential means of transportation. The same railroads must pay their share of cost and maintenance of the highways which are giving practically free rights to their competitors. Can we do without railroads? If not, we should see that they have the right to a fair return on their investment.

"The farmers of this state have suffered because the public authorities, state and county, in employing people, especially on road-building, set a day rate with short hours that would bankrupt every farmer in the whole state if he had to meet it and he is more or less in competition with it. When a man in the hay field or milking cows receives his $3 a day working 10 hours and finds out that right along the road a fellow is working at $4 or $5 a day, 8 hours, the farm employee becomes dissatisfied and then trouble arises.

"Taxes on farms are running from $2.50 to $20 per acre and this is prohibitive. If we do not take care of this basic industry, which furnishes 80 per cent. of all the production, we can not long boast of being the 'Great United States.'

"The easiest way and cheapest plan of obtaining money for road-building and upkeep is by a tax on gasolene. We must not lessen our interest nor lay off in any way in pushing our road program to completion."

Growth in Truck Output

Motor truck production in June was approximately 10 per cent. better than in May and was nearly equivalent to the highest month since July of last year and three times as great as the poorest month. It was almost equal to the average monthly output of 1920 and was more than twice as great as the monthly average of last year. Truck production in June was 25,982 and in May 23,694.

During the first six months of 1922 truck production showed an increase of 66.3 per cent. over the last six months of 1921, the figures being 114,128 and 68,624 respectively. In the same period the production of passenger-cars grew only 31.2 per cent., the figures being 1,035,769 and 789,414 respectively.

'Buses at Railway Meeting

The annual convention of the American Electric Railway Association to be held at the Municipal Pier in Chicago, October 2 to 6, will be the most important convention ever held by that body. The development of 'bus operation by electric railways in feeder service to their existing railway lines will be one of the paramount features of the convention in exhibits and discussion. The part played by truck manufacturers in developing 'buses suitable for passenger transportation will come in for careful study by the executives in attendance at the convention.

Another Truck Company

The Appleton Motor Truck Company, has been incorporated with an initial capital of $25,000 by A. G. Brusewitz, M. Rossmeissl and W. G. Jamison for the purpose of manufacturing and dealing in motor vehicles, parts and equipment in Appleton, Wisconsin.

Mr. Brusewitz was one of the principal officers and stockholders in the Reliance Motor Truck Company of Appleton, which a little more than a year ago was forced into bankruptcy through lack of adequate working capital for manufacturing the Reliance truck and axles.

Tire Production Declines

	1921.	1922.	
	July.	June.	July.
Crude rubber consumption by tire makers (lb.)	23,720,000	39,655,000	28,181,000
Tire production:			
Pneumatic	2,571,000	2,839,000	2,477,000
Solid	35,000	66,000	72,000
Tubes	3,021,000	3,131,000	3,068,000
Domestic shipments:			
Pneumatic	2,758,000	3,133,000	2,695,000
Solid	56,000	63,000	60,000
Tubes	3,603,000	3,974,000	3,631,000
Stocks, end of month:			
Pneumatic	3,892,000	5,042,000	4,834,000
Solid	220,000	170,000	176,000
Tubes	3,123,000	6,187,000	5,676,000

New Tariff Provisions Are Good for American Trade

25% RATE CAN BE RAISED TO 37½%

The newly agreed upon export features of the United States tariff, assuring equality of treatment in non-manufacturing as well as in industrial countries will stimulate American automotive trade abroad, according to J. Walter Drake, chairman, Foreign Trade Committee, National Automobile Chamber of Commerce.

Under the general export feature the newly lowered automobile rate of 25 per cent., if conditions warranted, could be increased by one-half, bringing it up to a maximum of 37½ per cent. If some manufacturing country were unwilling to allow a duty as low as 25 per cent. on American vehicles in return for an equally low rate on its automobiles brought into the United States, steps could be taken to have a higher rate up to 37½ per cent. apply.

In the extension of our trade with non-industrial countries, the general export feature of the tariff will also prove helpful. Finland is one of these countries. At the present time American manufacturers are at a handicap there, because French exporters pay a duty of 10 per cent. compared with 40 per cent. assessed on United States automobiles. With means now being provided such a discrimination would be discouraged either by concessionary or higher duties on paper and other products imported into the United States from Finland.

Truck Use in Indianapolis

Indianapolis is using 250 motor trucks for hauling coal and ice, according to the Indiana Tranfer & Warehousemen's Association. Among other important products hauled by truck in that city are:

Distribution of milk, groceries, laundries, merchandise, etc.	500
Delivery of sand, gravel and building material	250
Cartage delivery and distribution of vegetables and fruit products	85
Freight transfer, baggage and express	550
Manufacturing and building industry	175
Transfer of household goods	112

Standards for Rail Cars

The standardization of gasolene railroad cars was discussed at the July Truck Division Meeting of the Society of Automotive Engineers in consequence of a suggestion that had been received by the society that a new Division of the Standards Committee be established to work on the standardization of this type of vehicle. It was indicated that the conventional truck chassis will be the basis for the construction of gasolene railroad cars, rather than gasolene power-plant equipment being adapted to typical railroad-car construction.

There was considerable discussion as to whether railroad or automotive engineers should carry on such standardization work, general opinion indicating that the automotive engineers dividsion should be established.

More than one-third of federal-aid road projects completed and under agreement 1916 to 1921 were of gravel construction.

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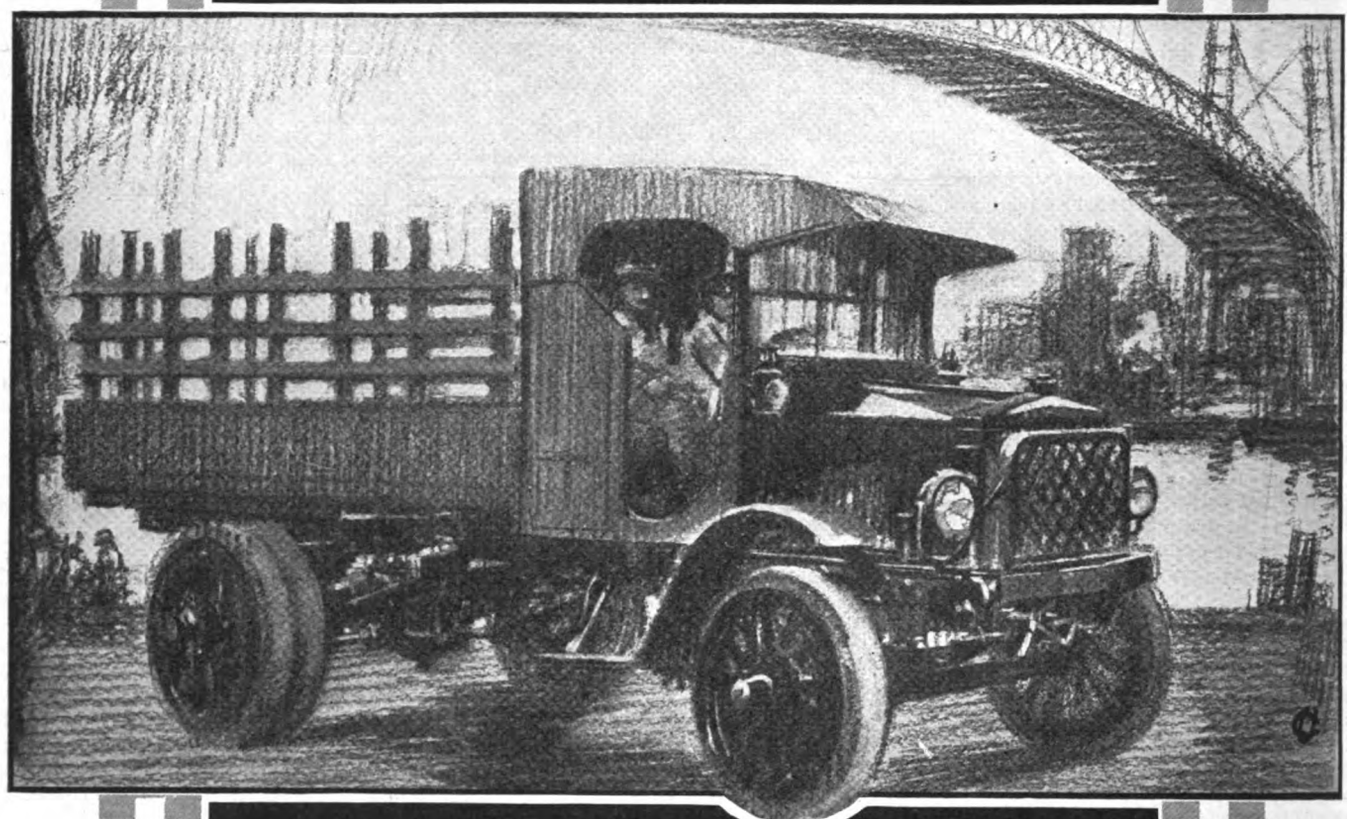

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

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New York Office, 51 East Forty-second Street.

"Get More Dealers"

AFTER design and manufacturing methods have been determined upon every factory's first cry is for distribution, it being inconceivable that motor trucks should be sold without a dealer organization. And, in the desire to press production, there is always the great and grave danger of getting too many dealers, for the strength of a distributing system is not to be measured by numbers but by quality. Since a good dealer costs no more than a poor one, the prudent factory aims to get as many good ones and as few poor ones as possible. This wisdom is not inborn, however; it usually arrives some time after the folly of establishing a dealer organization on the numerical rather than the quality standard has been discovered. And in some cases, we regret to say, the folly has never been discovered.

Several years ago one of the largest truck makers ascertained that each of its dealers had cost on the average nearly $500 and that, weighed by the standard of trucks sold, more than 80 per cent. of the dealers acquired had not made enough sales to repay the factory for its dealer development expense. On examination the reason appeared sufficiently clear: the sales department had been more interested in the number of dealers obtained than in their quality or their chances for success. The country was considered as a market composed of many thousands of cities and villages, in each of which a dealer could be acquired. Whether roads suitable for truck traffic were in existence, the amount of transportation present in each place, the population, the number of competitive dealers already established, the need for motor transport, the tributary population, the nature and extent of industry, the wealth of the people, the presence of other transportation agencies such as rail- and waterways—these were questions that were seldom or never raised. And in the case of nearly every other truck maker the problem was thought to be one of covering the country with dealers; a country of great extent and apparently unlimited resources should provide a truck market of infinite dimensions.

As a result of such lack of policy, or rather such lack of understanding of the problems and dangers of the business, the industry is distributing its product through an agency system made up of approximately 24,000 truck dealers, who have cost the trade at least $10,000,000 for their procurement alone, to say nothing of the losses that accrued by reason of improper appointments and the resulting shifting of agents from year to year, through which process more than 40,000 truck dealers have entered this industry and disappeared from it during the last twelve years. Because of, rather than in spite of, the large number of truck dealers now engaged in the truck business, more than three-fourths of them are relatively ineffective, and less than half of them sell 80 per cent. of the industry's total output.

Instead of wanting more dealers, the truck industry needs fewer; instead of more, let it have better; instead of expansion in distribution numbers, contraction is called for. No conscientious analyst of the situation that confronts the truck trade to-day could honestly recommend an increase in the number of selling factors. Those in existence are already literally falling over each other in the larger markets and are looking about in vain for business in the smaller ones. If the industry is already overstocked with dealers—many of whom are not competent to sell, many of whom have no opportunity to sell, and many of whom waste all their effort in combatting competition instead of in convincing buyers of the merits of their products—what earthly reason can there be for the cry of "Get more dealers?" As well ask for the building of more factories and for the enlargement of those already in existence, while demand languishes far below the aggregate producing capacity of the trade. When the public demand for trucks exceeds the manufacturing and selling capacity of the industry, then there will be time enough to plead for the enlargement of those facilities. To-day the industry is badly overmanned, overtooled and overbricked-and-mortared and, with the present state of business and the present extent and character of competition, it promises to remain in that condition until it can be shrunk to the dimensions warranted by public demand.

Boring From Within

WE FEAR there is a deal too much loose thinking and talking on the part of those who profess to speak with authority on the subject of good roads, and if the utterances of some self-appointed highway enthusiasts are a safe guide to the state of general opinion in that group some effective means of checking their foolish outbursts had better be devised. One of that number, Frank Terrace by name and president of the Washington State Good Roads Association by title, in speaking of the function of a highway, declared recently that it is "the accommodation of private owners of vehicles for their individual pleasure and business. They [the highways] are not designed or intended as permanent roadbeds for transportation business, and can never be depended upon to fulfill that function."

This gentle exponent of the importance of good roads must harbor some special ambition with respect to highway development that is incompatible with the public interest, for we fail to see how the rate of highway deterioration is in any way increased through the general adoption of a policy by which shippers elect to entrust their freight to professional haulers instead of hauling it in their own vehicles. In fact, the inauguration of professional haulage in lieu of individual vehicle ownership should reduce the wear of the roads by increasing the effectiveness of the

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transport vehicles and by reducing the number of them in use.

But Mr. Terrace is either a little too eager to make his point or a little too artless to conceal his purposes, for he subsequently discloses the reason for his twisted argument. "Are we," he asks, "going to . . . make and maintain such roads for traffic never contemplated, which can not take the place of the railroads, and only serve to bankrupt them? . . . Can we do without railroads? If not, we should see that they have the right to a fair return on their investment." And then, too, "when a man in the hay field or milking cows receives his $3 a day working 10 hours and finds out that right along the road a fellow is working at $4 or $5 a day, 8 hours, the farm employee becomes dissatisfied and then trouble arises." In fact, he sees in the development of motor traffic on the highways a menace to the future of the country and doubts whether we can much longer "boast of being the 'Great United States.'"

The Washington State Good Roads Association, if really interested in the development of highway transport, had better look for a new president and official spokesman. We seriously suspect that it is unknowingly harboring a railroad "undercover" man among its executives.

Helping Lame Ducks

THERE are some parts makers who believe that the future security of their business depends on the development of the maximum number of truck and car assemblers, each one of whom, hindered in growth by the competitive ravages of a multitude of similar underfed commercial establishments, will never be able to engage in the manufacture of the parts it uses on account of small production and will, therefore, provide an everlasting market for the output of the unit makers. One has ventured the opinion that the future will witness the establishment of at least one truck and car assembler in every city of more than 25,000 people, although, when asked whether the demand in such communities would support vehicle manufacture on a permanent basis, he admitted that he had not thought of that. Too many parts makers, struggling in a field that is itself overcrowded, cherish the foolish hope that they can overcome the competition among themselves by encouraging the formation of an infinite number of customers, without considering when or in what manner an insatiable public demand for transportation vehicles can be created. We have yet to see it, and, except for the war "boom" period, we have yet to see a demand that exceeded the industry's production facilities.

It is gratifying, therefore, to be able to record the expressions of Charles A. Dana, one of the country's most prominent and well-informed parts makers, voiced at the recent convention of the Motor & Accessory Manufacturers' Association. "The thought has come up in my mind many times," said he, "as to whether we are not creating too many of these [truck- and car-assembling] companies, so that we are weakening the credits that we should have from other companies that would give us more prompt payments and better credits. I don't think the future of our industry is going to be to encourage the greatest number of truck companies possible in the United States, or the greatest number of passenger-car companies. It is to try to have a reasonable number of good companies that can pay their bills, that have some money left in the bank, that are a credit and a going-concern risk to the public, the bankers and the officers who manage them."

There is wisdom in a nutshell. Every weak concern in the industry is a burden on the strong; every poor credit risk is a tax on the credit of the strong; every small producer is a parasite on the body of the large. Credit extended to the financially irresponsible raises the prices that must be paid by the financially stable; parts sold to the small-scale assembler help him compete with the assembler who produces on a large scale; every small producer increases the selling costs of the large one by confusing the buyer, by reducing the price and in other ways demoralizing the business. The horde of insignificant, unstable and unnecessary truck and car makers, as we have frequently pointed out, are the industry's greatest liability, and Mr. Dana has done the trade a great service in giving public utterance to his opinions on the subject. It is to be hoped that other parts makers who hold similar views will not be slow in adding the weight of their opinion to the end that feeling may be crystallized into policy and action.

Chicago to Have Finest 'Buses

(*Continued from page 5.*)

to give the traveling public rapid, reliable service in the finest cars yet conceived.

They will be operated on city boulevards exclusively, although the service may later be extended to care for every section of the city where there is a demand for it. A minimum of 250 'buses will be placed in service just as soon as the legal preliminaries are arranged.

The Yellow Cab Company is in no way identified with the new company, according to its president. He explained that a small group of business men have organized the venture, exclusive of any established business in the city, and that names of other men in the group will be made public soon. He declined to outline the details of the plans for the manufacture or maintenance of 'buses but it is rumored that the new vehicles will be built in Chicago by the company itself, using Continental motors and special bodies.

This system of manufacture and maintenance has been worked out to remarkable success by the Yellow Cab Company and, it is believed, the 'bus concern will follow the cab plan closely, using the present Chicago 'bus company barns and personnel as a nucleus.

Applications for permission to extend 'bus service to all city boulevards has been on file with the Illinois commerce commission for some time, and the new routes as outlined originally are included in the petition's renewal.

When franchises are granted it is believed that the 'buses will be taken out of the loop entirely, relieving State Street of congestion and the Michigan boulevard 'buses will be run straight through from north to south sides.

Back Numbers Wanted

The Librarian of Congress has asked us to furnish numbers 186 and 187 of Volume 24 of POWER WAGON (the May and June issues of 1920) to complete its file. This the publishers are unable to do, those numbers being out of print. Readers who have no further use for their copies of these issues will oblige the publishers by notifying them of their willingness to supply these copies, on receipt of which advice they will forward postage for their return.

Vehicle Shipments in August

During August motor vehicle shipments amounted to 32,563 car-loads sent by rail, 36,603 machines driven away, and 10,034 shipped by boat. In August of last year the corresponding figures were 20,758, 15,218 and 3,595. In July of this year the figures were 29,116, 28,100 and 10,034 respectively.

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Railway Propaganda Unfair to Highway Transportation

PRIVATE AND PUBLIC INTERESTS CLASH

"There are many electric interurban lines in Indiana that carry both passenger and freight," says a recent editorial in *Municipal and County Engineering*. "The development of highway transportation apparently has cut down the freight business of these lines, or at least promises to do so. Naturally, the interurban lines will not lose business if they can help it, and no fault can be found with their efforts towards self-preservation so long as they act fairly with the public, but, when they frankly appeal to ignorance and blind prejudice in their efforts to discredit highway transportation, they are deserving of severe censure.

"Many interurban cars operating on the Indiana lines bear large printed placards reading as follows: 'Problem in Economics: Ship by Union Traction and save the highways. If a heavy truck earns 50 cents per mile and damages the highway to the extent of $1 per mile, and the shipper of freight loses nothing, and the truck owner keeps the 50 cents, and the taxpayer pays the $1, where does the taxpayer get off?'

"There are, of course, many fallacies in this hypothetical question propounded by the interurban lines. The damage of heavy trucks to highways is very much less than the value assumed in the question. For example, there are some gravel and stone roads leading into Indianapolis that carry at least 100 trucks a day for 300 days in the year. At the rate of damage assumed in the question these roads would be damaged annually at the rate of $30,000 per mile, but the fact is that these roads are maintained in good condition for less than $1,000 per mile per year. Quite a difference between biased assumptions and the facts in the case!

"Other fallacies in the statement lie in the assumption that only the shipper and truck owner benefit by highway transportation; nothing is said of the ultimate consumer who, in the aggregate, makes up the general public. Also, the fact that the shipper, the truck owner and the ultimate consumer are themselves taxpayers is ignored.

"However, it is not so much with the fallacies as with the plain intent of the question that we are concerned in this discussion. The plain intent is to discredit highway transportation, in the interest of interurban transportation, by making appeals to prejudice by means of false statements. If road construction can be checked, the development of highway transportation can be checked, and that is the object, or will become the object, of forms of transportation that compete with the highways for business, whenever the competition of the highways begins to 'hurt.'

"We wish again to warn all workers in the highway field, and all who are interested in seeing a dependable and adequate system of highways constructed in the United States, that in safeguarding this great development it is not sufficient to rely on brotherly love alone. As we have before pointed out, the highways represent the purest form of public ownership, while the steam and electric lines represent the purest form of private ownership of public utilities. When these opposing interests clash the privately-owned utilities will fight with every available weapon purchasable with gold. One such weapon is publicity calculated to misinform and mislead the public. Another such weapon is the controlled public official, whether he be in the city council, on the county board, in the state legislature, or in the congress of the United States, who has opportunity to vote against appropriations for road construction or maintenance, on licensing and operating motor vehicles, etc. Our political history proves only too well that many men are willing to accept the financial backing of special interests during a campaign in exchange for later service to these special interests at the expense of the public. If the railways ever really believe, rightly or wrongly, that they will be injured by highway development, they will do all they can to kill the highway movement, and their all is very considerable.

"The truth about highway transportation must be kept before the public or the public will quickly accept as true the false statements issued to injure highway development. In Lincoln's famous statement about fooling the people the emphasis is usually placed on 'but you can't fool all the people all the time.' It would be much better to place the emphasis on 'you can fool part of the people all the time,' and to realize that this part lies somewhere between 99 and 100 per cent., unless that which is true is advanced as consistently and as cleverly as that which is false.

"Those who believe that highway development is for the good of the country as a whole will do well to be very active and alert in safeguarding this development. They will also do well not to 'fall' too hard for railway propaganda of any kind."

Ratings for Motor Trucsk

In response to demands from the highway authorities of the State of Connecticut, a meeting was held at Detroit on July 24 to discuss the formulation of a "yardstick" of gross carrying-capacity and safe operation of motor trucks for administrative use by licensing and law enforcement officials that can be definitely determined by the manufacturer, buyer and the law enforcement official. This meeting was attended by members of the Truck Division of the Society of Automotive Engineers, a representative of the National Automobile Chamber of Commerce and representatives of various truck builders.

It was felt that there is a definite need for a rating and that the essential elements to be considered are the strength and ability of steering-gears and of brakes and the strength of the axles. It is considered that these three factors are the important ones in determining the safety ability of a truck on the road and that all are equally important. A subdivision, consisting of A. K. Brumbaugh, chairman, D. C. Fenner and A. J. Scaife, was appointed to submit the suggestions of the meeting to the manufacturers for their consideration and comment.

International Harvester Co. Plans Neighborhood Service

INTRODUCES NOVELTY IN CHICAGO

Steadily increased business year after year in International motor trucks in Chicago has necessitated an extensive enlargement of sales and service facilities. Instead of enlarging its present service quarters at 1814 Michigan Avenue and providing one big central station, the International Harvester Company of America has decided for the convenience of its Chicago patrons to establish widely separated stations of sufficient capacity to take care of their needs for some years to come. Hence, in addition to the present Michigan Avenue station, three new stations each of approximately 20,000 square feet floor area will be built at the following locations: Diversey Boulevard and Clybourn Avenue, Western Avenue and Marshall Boulevard, and Racine Avenue and 121st Street. This will give the company 80,000 square feet of service space in Chicago, exclusive of its large manufacturing interests in the city.

The present Michigan Avenue sales and service station will serve the loop district and the near South Side, the new Diversey and Clybourn station the north and northwest sections of the city, the new Western Avenue and Marshall Boulevard station, the west and southwest sections, and the new Racine Avenue and 121st Street station, South Chicago, Pullman, West Pullman and other extreme southern sections of Chicago. Each section will be equipped with modern machinery to give quick and efficient service and will be operated by factory-trained mechanics. Each station will also be provided with a completely appointed salesroom for the display of the full International line which includes twelve models from the 2,000-pound speed truck to the 10,000-pound heavy-duty unit.

Free inspection by factory-trained inspectors at regular intervals has been a feature of International service for the past two years add will be available at all four stations. This free inspection service has no time limit. It is available to owners as long as their trucks are in service, whether a year or ten years.

Railway Protests Truck Haulage

The Philadelphia & Reading Railway Company has filed a protest against the application of the Public Service Transportation Company for a certificate of convenience to operate motor trucks in carrying freight from Philadelphia to connecting transit lines in the suburban sections on the ground that it would compete with the existing steam railways facilities. The transportation company is headed by G. W. Ravast, general freight agent of the Philadelphia Rapid Transit Company, the city's street-railway operator, and was recently organized to take over the freight hauling of that concern. The case presents the unique situation of one railway protesting against the developing of motor transport enterprise by another.

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Truck Makers Must Study Rail Motor Coach Problem

ORDINARY SELLING METHODS NOT GOOD

"Light local-passenger service, which involves the operation of a steam locomotive and not more than three coaches, is undoubtedly the most expensive service performed by the railroads in proportion to the revenue received," said L. A. Plant at a recent meeting of the Society of Automotive Engineers "Testifying before the Interstate Commerce Commission in regard to railroad problems and the efficiency of railroad management, Mr. Willard, president of the Baltimore & Ohio Railroad, recently made this significant statement regarding railroad passenger service:

'The expensive feature of the passenger business is not the ordinary running of the heavy through-trains. My observation is that usually they pay. The expensive part of the business is the running of thousands of miles of unprofitable passenger service on light branches, or light portions of main lines where the people demand the service. I have not made figures recently, but I recall that a few years ago some 30 per cent. of the total passenger traffic carried by the Baltimore & Ohio Railroad earned less than the actual out-of-pocket cost. We earned less money than the actual wages paid to the trainmen and enginemen, for the coal burned and the oil used, and there was not a single train either that we could take off. They were established and have been run in response to the public demand; and I am not in position to say that the public is not entitled to the service. Usually the service consisted of two passenger trains in each direction over branch lines. The business did not justify running trains, but the people had no other way to travel.'

"While Mr. Willard did not refer to the steps taken by his railroad toward reducing the cost of this service, it is understood that the Baltimore & Ohio Railroad is actively interested in the possibilities of the gasolene motor car. It is our belief that in the present and prospective designs we have the solution to the problem outlined by Mr. Willard. In fact, my experience some years ago in the purchase of a small railroad in a mountainous section of Virginia convinced me of the value of the gasolene rail motor car as a means for handling light local passenger traffic. This road had been a losing venture for many years and, in planning for the future operation of the road, I conceived the idea of purchasing a motor 'bus, such as I had seen operating on the streets of Birmingham, one of the first southern cities to adopt 'bus transportation extensively, and equipping it with flanged wheels. I have since been a firm believer in the gasolene railroad-car as a practical means of reducing the cost and improving the character of local passenger service, provided the elements that have contributed to the success of the motor truck, such as simplicity of operation and maintenance, light weight and low first cost, are not ignored. It is interesting to observe that a recent investigation into the use of gasolene rail-cars on short-line railroads revealed the fact that in every instance the substitution of gasolene service for the steam locomotive had converted an annual deficit into a surplus, although in many instances gasolene equipment of the most primitive type was being used.

"In view of the interest on the part of railroad officials, it is perhaps puzzling to the builders of gasolene cars to find so much hesitancy on the part of the railroads toward the actual purchase of the equipment, even where the capacity of the rail-car has been demonstrated and the operating economies are obvious. If a motor truck builder can convince a local coal dealer that he can save $1,000 per year through the substitution of a motor truck for team delivery and the dealer can finance the purchase, the sale of the truck is ordinarily assured, but it should be borne in mind that in this case the profit from the investment will accrue directly to the dealer, whereas the meager profit resulting from railroad operation is paid to stockholders whose connection with the actual details of the service is usually remote. I do not wish to indicate that railroad managers and employees are not making a sincere effort to improve the efficiency of railroad operation in every possible way, but their less responsive attitude can be ascribed chiefly to a lack of business initiative that is more or less characteristic of all large institutions.

"While railroad officials are undoubtedly interested in the development of the gasolene rail-car, they are inclined to see the objections to this equipment rather than its possibilities and to stress the importance of certain changes in the details of the construction of the cars instead of the lower operating cost of and small investment required for the equipment in its present form. Railroad officials also are inclined to want equipment that will duplicate the existing steam service. In the situation described by Mr. Willard the question is not necessarily that of duplicating the performance of the two passenger-trains that operate daily in each direction over branch lines, but of expanding the service and of building up additional traffic at less cost than is possible with steam operation. It is conceivable that on local service radiating from a shopping center a gasolene rail-car could be maintained in continuous operation throughout the day and handle a greater number of passengers at less cost than is possible with a steam train. It is reasonable to assume that more frequent service would stimulate a greater volume of traffic.

"I have in mind a typical situation on a short branch-line where there is but one train into town early in the morning and one train returning late in the evening. The installation of a frequent gasolene rail-car service throughout the day would not only attract more travel, as in the case of the electric line, but enable the railroad to handle a greater number of passengers per day at a lower cost. Notwithstanding these obvious possibilities, we find that one railroad is not interested in gasolene rail-cars unless the cars are designed to seat 72 people, while another road insists that the equipment must be capable of pulling four or five box-cars if necessary. Still another railroad expects to use its old coaches weighing some 60,000 pounds as trailers rather than charge this equipment off its books, this being a case where the railroad has failed to make a sufficient depreciation allowance for the coaches and is carrying them at a higher book-value than they are actually worth.

"On the other hand, there are certain requirements of the railroad, particularly those that relate to safety, the importance of which may not be fully appreciated by manufacturers, but which designers, in their desire to make the equipment as light as possible, should not ignore. Builders of gasolene rail-car equipment can not yet be said to have a full understanding of the problems involved and an appreciation of the fact that it is not what the car is, but what it will do, that interests the practical railroad man. Generally speaking, the manufacturers have not differentiated between the problem involved in marketing trucks and the problem of selling to the railroads. It will necessitate an organization that understands the railroad problem and the full significance of departmental relationship that is foreign to the ordinary commercial organization. I believe that the arrangement to market gasolene rail-cars through local agencies that receive a large commission would not appeal to the railroads, and that the service feature so essential to the truck business would not meet with favor on the average railroad. It will be necessary in a majority of cases not only to demonstrate that the car will operate, but to show the railroads where they can use the cars to advantage; and this involves a large amount of educational work."

New York Buys 128 Whites

A contract for 128 five-ton motor trucks, just awarded by the City of New York to the White Company, Cleveland, following a previous order for 212 trucks of this make some time ago, gives the White Company the two largest orders for motor trucks ever placed by a municipality and gives the street-cleaning department of the City of New York the largest known fleet of standardized heavy-duty trucks. Specifications required bidders to produce verified records showing at least 100 heavy-duty trucks which have covered more than 75,000 miles.

One hundred and twenty of the trucks will be equipped with power dumping bodies developed especially for refuse collection under the conditions existing in New York. Each will carry 6 yards of refuse. They will be used for all phases of street-cleaning work, including the removal of ashes, garbage and snow. Six will be provided with winches and two will be equipped with apparatus for handling wrecks.

New York City has found motor trucks essential in keeping its thousands of miles of streets in a sanitary condition. The city has a nationwide reputation for clean streets and, because of the constant growth of the street-cleaning problem, large investments in motor equipment have been necessary. To protect the city against the blocking of thoroughfares by heavy snowfalls, such as happened two years ago when New York traffic was paralyzed for days, a method of attaching snow-plows to the front of the trucks was developed and, on short notice, the city can throw into service a great battery of "snow fighters."

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Protests Discriminatory Taxes

Reaffirming the continued opposition of the automotive industry to the "discriminatory war excise taxes," C. C. Hanch chairman of the Taxation Committee of the National Automobile Chamber of Commerce has addressed a letter to each nominee for congress, asking him whether he favors repeal of this legislation.

The communication, which was unanimously approved by the board of directors, points out that congress itself emphatically indicated its desire to repeal these taxes in the passage of the 1921 law when the taxes were removed from some articles and reduced on others. "In no case," Mr. Hanch points out, "did congress increase such taxes or add new ones.

"Apparently congress believed it of greater importance to relieve musical instruments, sporting goods, chewing gum, thermos bottles, fur articles, picture frames, perfumes, toilet waters and hair dyes, than individual transportation. In this belief we do not concur and we feel that the only equitable thing in the interests of fair play and the welfare of industry as a whole is to repeal all discriminatory war excise taxes."

The letter is accompanied by a memorandum which shows in graphic form the repeals and reductions made in the tax law of 1921 as against the law of 1918.

In addition to the signature of Mr. Hanch who is vice-president of the Lexington Motor Company, Connersville, Indiana, the letter bears the names of the other members of the committee as follows: H. H. Rice, president, Cadillac Motor Car Company; J. Walter Drake, chairman of the board of the Hupp Motor Car Corporation: George M. Graham, vice-president, Chandler Motor Car Company and F. J. Haynes, president, Dodge Brothers. Charles Clifton, president of the chamber and chairman of the Pierce-Arrow Motor Car Company, is also listed as a member ex-officio of the committee of which Pyke Johnson is secretary.

Republic 'Buses for Providence

The United Electric Railways Company of Providence, Rhode Island, has placed an order with the Republic Truck Sales Corporation for six 25-passenger single-decked buses, equipped with Knight sleeve-valve engines as an adjunct to their rail system. These 'buses were ordered after a thorough test over their lines of a "sample" 'bus. The 'buses purchased are similar to the 27 recently installed in regular service in Baltimore, by the United Railways and Electric Company of that city.

Another Truck Coming

The Cleveland Tractor Company of Cleveland will manufacture a 1¼-ton motor truck in addition to the Cleveland tractor and the Zeder passenger-car, production to commence, according to schedule, in October. The truck will employ the same engine as the tractor, which was designed by Rollin H. White, president of the company. Fred W. Ramsey, former president of the Cleveland Metal Products Company and a power in Cleveland financial circles, has been made chairman of the tractor company's board of directors.

Decentralization of Population Makes Motor Market

By ALFRED REEVES

General Manager, National Automobile Chamber of Commerce

THE present prosperity in the automobile business means employment for 2¼ million people. In addition to the 200,000 men working in the automobile plants, to the hundreds of thousands of professional chauffeurs and drivers and of retail garage employees, there are about 250,000 accessory factory workers, 150,000 tire dealers and salesmen and thousands more in allied retail trades.

One can realize also the effect on other industries by the fact that 22 per cent. of the aluminum supply, 4 per cent. of the annual production of iron and steel, 20 per cent. of tin, 16 per cent. of copper output and 30 per cent. of plate glass manufacture are used in the making of motor cars and trucks.

This effect of the public demand for increased modern transportation naturally is a very prompt stimulus to the business of those factories making parts and accessories. Sales for the past four months have been the largest for any similar period on record due to the keen competition on the part of manufacturers, each endeavoring to get a large amount of business by giving the most value for the money. In fact, more value for the money is being given to-day in motor vehicles than any previous time in the business. This is reflected in the accessory market by the increase in the equipment and appointments supplied with the finished product and the creation of a public desire to get the last word in motor improvement.

This year's production should exceed 2,000,000 cars and trucks. I believe it is safe to say that next year, with export demands increasing, more than 2,250,000 motor vehicles will be sold. In this year's production, about 10 per cent. are trucks, but the truck production will keep on increasing as general business gets better. Of the cars produced this year, probably 70 per cent. will sell at $1,000 or less.

Shipments from the factories during August were the biggest in the history of the industry. Preliminary reports indicate a production in August of 270,000 vehicles, of which 22,000 were trucks. This is 20 per cent. more than July and only 25,000 less than June, the biggest month in the history of our industry.

During the first eight months the industry has made 1,664,000 motor vehicles, which is practically equal to the full year's production of 1921, when the figures were 1,668,000. Of the car production this year, about 30 per cent. were closed cars and this proportion I expect to see increased to 50 per cent. within the next few years.

Our reports show an increasing use of motor vehicles over the highways, not alone in the use of passenger-cars but trucks and motor 'buses. Over half a million persons motor camped in our national parks during the past year. Motor 'bus lines are now running regularly in 108 of the largest cities. There are 12,000 consolidated schools in the United States, according to the United States Bureau of Education. Most of these are using motor 'buses to transport children. There are still 194,000 rural schools not yet consolidated.

Rome, Georgia, is organizing a rural agricultural school using motor 'buses to market the products and to transport 500 students. Chicago "L" lines announce plans to use 'buses as feeders. Twenty-three electric railways are using 'buses as feeders to their main lines. Twenty-eight steam railroads in 23 states are using flanged-wheel motor 'buses to handle short-line business.

Parts and accessory makers may look for business even better than they are doing this year. But I believe there are additional possibilities open to those firms which can develop new and useful devices. This is fully as true as the foreign field as of the American. In fact in some countries, such as Argentina, owners will some times use several types of horns on one vehicle.

An important assurance of the future of the automobile business lies in the fact that cars and trucks in the main are creators of wealth. It was readily recognized from almost the beginning that railroads were builders of empire, but the editorial minds were slower to realize that motor cars and motor trucks, developing the country intensively, are also productive of economic value. The industry itself was partially responsible for this lack of apprehension because in its advertisements it stressed the recreation feature, a desirable element, but one which could not alone explain the continued increase in motor transportation.

But recently even as crtical a mind as that of Roger W. Babson has pointed out that thousands of persons have been buying motor cars and moving into the suburbs. A survey of the various real estate boards by the N. A. C. C. developed the fact that around sixty cities in the country there are over 135,000 suburban homes depending chiefly on the motor car and motor truck for transportation. This release of housing pressure on the cities and the settling of families on less expensive land gives promise of lower rentals, a prediction in which many leading economists of the day concur.

There are about 3,000,000 farmers in the country owning motor vehicles to-day. A survey of farmer owners indicated that the use of motor transportation increased the average farmer's efficiency of 68 per cent. In olden times it used to be said that the farmers could not afford the number of horses which they were using, but still less could they afford to be without them. The same applied to power machinery including motor transportation to-day.

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Intercity Furniture Haulage at 33 to 62 Cents a Mile

By WILLIAM F. HENDERSON

Cambridge, Massachusetts

WE HAVEN'T a single criticism to make regarding our trucks. Their dependability enables us to make good profit with them. Our 1½-ton, for example, does the work of two teams; yet it operates for only $12.59 per day with driver and helper, and has cost only $200.00 for repairs in 2 years and 9 months.

We make a specialty of packing and moving furniture. In June, 1919, we purchased a 1½-ton truck and 2 years later bought a second-hand 2-tonner, which was a 1919 model. These trucks are equipped with furniture bodies and are used for moving furniture between homes and for intercity work. They also do general hauling around town, including hauling all kinds of merchandise from freight depots to factories.

The trucks cover all Cambridge, Boston, and vicinity, and frequently make long-distance trips moving furniture, including 15 to 20 trips to New York. They have also made a trip to Bangor, Maine, a distance of 320 miles each way. As a matter of fact, people nowadays expect truckmen to make long hauls, and we must be prepared to do it or lose business. With good trucks there is good money in it.

Long-distance trucking is far faster, more dependable and less damaging to the furniture than freight shipment. On these long trips we charge about $1.00 a mile, so the trip to Bangor would cost $320.00. If shipped by freight, the freight itself would be about $100.00 and packing $200.00. In addition there would be some expense for carting at both ends, and unpacking, which would make the cost a little more than by truck. The big advantage is that the truck gets the goods to the new home in 3 days, as against about 2 weeks by freight, thus saving time and hotel and restaurant bills for the family. In general we figure that it costs less to ship furniture by truck anywhere within a 300-mile radius.

For the New York run we are able to make a special rate of $175.00, because we often get return loads. Since the packing expense alone for a freight shipment to New York would be about $200.00, there is considerable saving to the shipper through using a truck.

The 1½-tonner usually carries about 2 tons to the load. It averages 20 miles a day and 2 to 3 trips. In the 2 years and 9 months it has been laid up for about 40 days. However, most of this idle time was due to lack of business during the recent depression.

The cost of operating the truck is very reasonable. Figures on the 2-tonner are not available; but the 1½-ton machine costs $12.50 a day, 62.9 cents per mile, $2.5169 per ton, and 62.91 cents per ton-mile. Deducting the $7.83 per day paid to driver and helper, the cost is only $4.75 per day.

In arriving at these costs we figure depreciation on a basis of 35,000 miles life, which at the present rate of travel will amount to about 6 years. We depreciate tires at 15,000 miles, and make an allowance for repairs and maintenance of $200.00 a year. This is ample, since the truck has cost only about $200.00 for repairs in 2 years and 9 months.

Of course, on the long-distance trips the operating cost per mile is considerably reduced by the greater mileage traveled per day. In the trips to Bangor, Maine, for example, the fixed expense and driver's wage per day remain the same, the variable expense is governed by the mileage, and we must include lodging and meals for the driver and helper on the road. This makes the cost per mile 33.68 cents, as against the average of 62.91 cents; and the total cost of the 640-mile trip around $215.00, as against the $320.00 received for making it.

Neither of these trucks has been to the service station, except for adjusting the magneto and making minor repairs. They are governed to 18 miles an hour and do not overspeed. The drivers do their own repair work.

The truck effects a considerable saving over horses, since it does the work of at least 2 teams. We used horses for years, having 3 double rigs and a single; but replaced them with the trucks because they were too slow. Customers demand fast service, and the only way to give it to them is with fast, dependable trucks.

OPERATING RECORDS.

Total Period.

Period covered	33 months
Days operated	785
Total round trips	1,962
Deliveries, pickups	1,962
Total loads, tons	3,924
Miles traveled	15,700
Gasolene, gallons used	1,963
Cylinder oil, gallons used	65½

Daily Averages.

Round trips	2½
Deliveries, pickups	2½
Total loads, tons	5
Miles traveled	20
Miles per round trip	8
Load per trip, tons	2
Ton-miles	20
Miles per gallon gasolene	8
Miles per gallon oil	240

COST RECORDS.

Investments.

Chassis, etc., complete	$2,635.00
Tire value	161.90
Total less tires, to be depreciated.	$2,473.10

Fixed Charges—Yearly.

Interest on total investment 6 years at 6%)	$ 92.22
Taxes and licenses	20.00
Insurance	220.00
Garage expenses	144.00
Total per annum	$ 476.22
Total per month (per day $1.67).	39.68
Total for period	1,309.60

Variable Charges—Period.

Fuel at 28 cents a gallon	$ 549.64
Cylinder oil at 60 cents a gallon	39.30
Tires—15,700 miles ($161.90 ÷ 15,000-mile life)	169.56
Depreciation—15,700 miles ($2,473.10 ÷ 35,000-mile life)	1,109.99
Maintenance and repairs (estimated)	550.00
Total variable charges (per day $3.09)	$2,418.49
Driver's wages, helper (per day $7.83)	6,149.00
Total fixed charges	1,309.60
Total operating costs	$9,877.09

Unit Costs.

Cost per day operated	$ 12.59
Cost per mile traveled	.629
Cost per ton hauled	2.518
Cost per ton-mile	.629
Repair cost per mile—estimated	.035
Repair cost per mile—actual	.013

Driveways More Common

The National Automobile Chamber of Commerce is closely watching the coal priority rulings to see that the industry is placed at no undue disadvantage compared with other manufacturers. James S. Marvin, assistant general manager of the N. A. C. C., says:

"Even if the rail strike is settled soon, the automobile industry is going to be affected in the matter of deliveries this fall. Already driveways are becoming more and more necessary because of the increasing difficulty in getting the necessary freight-cars. This may get worse before it gets better and adds to the difficulty of keeping automobile cars in this service.

"Despite the strikes, general business is improving to such an extent that the demand for freight-cars is increasing. On top of this comes the crop movements which need still more freight-cars. With the automobile industry in heavy production right now difficulty is found in getting enough transportation to carry its product, despite the fact the railroads now have more automobile freight-cars than ever before.

"Fortunately this scarcity of transportation is not going to make us shut up shop. We have learned how to deliver cars over the road and this fall will see driveways utilized to get the new cars into the hands of the dealers."

Heavy Traffic into Canada

Returns compiled by the Canadian Department of Customs indicate a 600 per cent. increase of motor traffic into Canada. Machines entering Canada during the last calender year totaled 617,285, compared with 93,300 for the previous calendar year.

Of the total number of cars registered in the last calendar year 615,074 remained in the dominion for less than one month and 2,211 for more than one but less than six months. The Parks Branch of the Department of the Interior has calculated that this motor traffic represents an expenditure in Canada of more than $108,000,000, and it is estimated by the same authority that, on a basis of 5 per cent., "improved roads are worth over two billion dollars without taking into account the service they render Canadians themselves."

The registrations in the different provinces were as follows: Nova Scotia, 223; Prince Edward Island, 22; New Brunswick, 1,826; Quebec, 43,264; Ontario, 537,283; Manitoba, 3,080; Saskatchewan, 427; Alberta, 363; British Columbia, 25,957.

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What Can Railways Do with Trucks?

By ARTHUR H. BLANCHARD
Professor of Highway Engineering and Transport, University of Michigan

WHAT is the present attitude of railroad officials in the United States towards the development of highway transport? The answer is not a simple one to formulate as many diverse opinions have been expressed in words and actions. Some of our railroad officials appreciate the intristic value of highway transport and have made use of it as a part of their own transportation systems. Others have advocated its development because they appreciate that it is necessary to the success of their business, that facilities should be provided for economically transporting goods over highways to be later carried by railways. Others have been concerned regarding the development of highway transport from the standpoint of destructive competition with railroad transportation and have endeavored to curtail its development through legislative action. Others, and it is hoped that there are only a few in this class, have considered the subject from such a narrow viewpoint that they have advocated a curtailment of highway improvement.

The railroads can render valuable service to the public and to themselves by helping to develop highway transport as feeders to rail lines and as extensions of rail service. The railroads can afford to assist in the working out of this problem. Some of the basic principles of the economical utilization of highway transport will have been solved only when highway transport service is used to expand efficiently the territory tributary to the railroad lines, to solve the terminal congestion problem, and to relieve car shortage by taking care of the short haul—which is now most expensive for the rail lines themselves. A correct and immediate solution of the interrelationship between these two links of our national distribution system is very desirable in the interests of all concerned. By no means can the railroads afford to ignore the interest they have in the efficient establishment of highway transport as an auxiliary to railroad transportation.

What are the opportunities for the railroad to function as an operator of highway transport?

(1) Interterminal transportation of freight by motor trucks. The advantages of the utilization of highway transport in this connection have been appreciated by railroad officials. It has been established in some cities, the most notable example being the case of Cincinnatl.

(2) Intraterminal and freight-yard highway transport. It is believed that the utilization of motor trucks by railways in transferring commodities, especially l.c.l. freight, from cars to shipping platforms and warehouses would materially expedite the delivery of freight and would reduce idle time of cars standing on sidings.

(3) The collection and delivery of freight in municipalities and adjoining areas. This phase of highway transport if used by railroads, would be a partial development of what is commonly known as the store-door delivery plan. The ruling of the Interstate Commerce Commission in the case of the Baltimore development along this line may mean that it is impracticable for railroads at present to utilize highway transport in this manner except on such a large scale that the charge of discrimination in services rendered could not be brought against them. In England we find a working illustration of railroads functioning as operators of highway transport in this field. One of the most notable examples is the case of the London & Northwestern Railroads comprehensive system of freight delivery by motor trucks in areas with headquarters at London, Birmingham, Manchester, Liverpool and Leeds. This railroad established this service in 1905 and in 1920 was operating over 350 motor vehicles.

(4) Extension of transportation service through the development of intercity and motor 'bus routes. There are several methods of development practicable in this field. Urban and interurban electric railway lines may logically expand their passenger transportation facilities through the establishment of tributary motor bus' routes. An illustration is afforded by the case of the Akron street-railway's acquisition and operation of a fleet of motor 'buses to supplement its traction system.

Steam railroads may enter this field through the development of intercity and rural motor express lines to carry both commodities and passengers. One of the most notable examples is afforded by the highway transport services of the Great North of Scotland Railway Company which established its first highway transport passenger service in 1903 and its first motor truck service in 1904. In 1921 this railway company was operating five passenger routes varying in length from 7½ to 19½ miles and seven intercity motor truck routes varying from 9½ to 19½ miles. Railroads having stations in scenic areas may well give consideration to another branch of the Great North of Scotland Railwal Company's highway transport service, namely the operation of a motor 'bus line for tourist traffic from Aberdeen through the lake region of northern Scotland.

The short-line railroads, in many cases, are faced with the alternative of suspending steam railroad passenger or freight service, or both, due to the high cost of operation and maintenance and the low revenues received, or of remodeling their transportation systems. Several methods have been suggested in order that the returns on the investment may be materially increased. The gasolene motor rail-car appears to have passed the experimental stage. The utilization of this vehicle on short-line railways for the transportation of passengers, express packages and l.c.l freight is a logical economic evolution of railroad transportation methods. The development of feeder service at way stations and extensions of motor rail-car service at terminals by the utilization of motor truck and motor 'bus lines appears logical, under favorable operating conditions. Some short-line railroads may consider it advisable to replace the track with a pavement and operate their private right of way for the use of their own trucks and 'buses or as a toll road or a combination thereof.

In connection with some branches of highway transport the railroad has certain economic advantages from the standpoint of overhead expenses. A traffic department is a part of its organization and may be readily expanded to supervise its highway transport activities. The basic principles of management in an efficient railroad traffic department do not have to be developed and the economic fundamentals of the relation between operating expenses and revenues do not have to be acquired at the expansion of either business failures or costly experience.

The establishment of highway transport clearing-houses and warehouses will usually mean not more than a rearrangement of its shipping and receiving platforms and buildings with an expansion of such facilities as the growth of its highway transport division demands. Garages and repair shops may be combined with locomotive and car-sheds. Generally idle real estate is available for administrative offices, storage tanks and other structures as they are needed.

The future development of the utilization of highway transport by railroads should receive careful consideration from the standpoint of the efficient development of transportation by railway and highway. Railways may seek powers to operate highway transport both in connection with rail transportation and independent thereof. The present railways bill, now before the British Parliament, said to be supported by the Northwestern & Midland Railroad group, contemplates an extensive development of the utilization of highway transport by railroads throughout the British Empire with the object of securing powers to conduct highway transport of commodities carried or to be carried by railroads or independent thereof. The public should bear in mind that some railroads may have ulterior motives in seeking to secure the right to operate highway transport.

An unfortunate retardation of the development of efficient highway transport in a given community might be accomplished by a railroad by elimination of competition either through the control of routes by franchises or through "cut-throat" haulage prices. If franchises are to be granted railroads for the development of highway transport services, such franchises must be safeguarded by regulations covering the service to be rendered.

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Profits Must Grow and Credit Risks Decrease

By CHARLES A. DANA
President, Spicer Manufacturing Company

THE tremendous depletions represented by shrinkages in inventories following the close of the after-war "boom" had to be taken out of either the undivided profits of the company, the surplus or through a sale of some form of investment or securities. The result is that many companies have not sufficient working capital. It may be due somewhat to lack of sales experience. More attention should be given both by truck and passenger-car manufacturers to better sales, more permanent sales, better distribution of both cars and trucks. It may have been caused somewhat by a greater quantity of different name plates of passenger-cars or trucks than there is a demand for. It may have been caused by bad judgment. But the fact remains that today there is a lack of working capital.

We parts makers, who sell to those various accounts, have to decide as to what we are going to do with them, because we are in the position of the owners of those businesses. I am speaking very frankly about this because I think it is a serious matter that we, who are in the parts branch of the industry, are the owners of a great many of the truck and passenger-car manufacturers even though we do not have the shares of stock in our names.

We should recognize that so that we may lend every endeavor that we have and every thought that we have and all our experience to help to show them how they should sell, to help show them how they should finance their immediate requirements in order to liquidate some inventory that they already have on hand. We should show them how they may operate at lower costs and with a reduced labor cost, and how they, perhaps, should change their design so that the article that we are contributing to may be merchantable and more salable.

That has led us to the creditors' committee which was not known some time ago. They used to go into receiverships.

There are two necessities for mergers. One is a financial necessity, in which one company needs the support of another company that is better financed, or they will secure financial assistance by making the proposition larger so that the securities are more marketable.

I know of one automobile group in this country now in which the several companies were too small to warrant the financing of a sufficiently large amount of securities to support each of them, and consequently they blended together one corporate entity so that that corporation would be able to issue a larger block of bonds which they could sell at less discount and which would be more readily marketable, and by means of having the greater marketing they are going to get their money at a lower rate of interest and are going to be able to sell the bonds that they couldn't have done as individual entities. That would help all the creditors of those several companies, because by means of that new money that comes in, even though it is a recorded obligation, it will help. It will help the creditors in getting a greater percentage of their claims paid eventually by continuing those companies, by means of this new money that is secured by this larger funded bonded obligation.

That is the type of merger that is founded from financial necessity. The other type of merger is the one that is founded from economic necessity, such as the steel corporation, or to the Consolidated Coal Company, or the American Radiator Company, or the Bethlehem and Lackawanna steel merger. It was their economic necessity to have a corporation large enough to finance not only their ore digging, the transportation of the ore, but the manufacture of either the billet, the ingot or the pig iron, and then the shipping of that to the finishing processes of the various classes of steel that are used in our industry.

I have not been able to see the instance where there is a success in a merger that has been made for economic benefit where it has all been centralized in one administrative head. That policy was exemplified by Judge Gary when he formed and created the steel corporation by the merger of the various steel industries throughout the country. He showed great wisdom in perfecting this enormous industry which in each of its entities is strong and aggressive, and no particular one is pulling the other one along as a lame duck. Each plant manager is able to handle his own production, his own manufacturing in his own mine, and it is only where the sales of the one article are provided for that there is a centralization of organization.

As I look into the automobile industry, I think the same rule prevails. The largest entity in the automobile industry I think is distinguished for the success of individual plants, and without mentioning names, we look to the various plants of the largest automobile manufacturer, and we attribute the success of the cars that any one of the members of that organization make, to the officers and the organization of that company, and, as I see the workings of the minds of those who are conducting the business of this large industry, they are trying to encourage that more and more.

I would like to say this in regard to the general policy of parts manufacturers. I meet a good many, I see a good many balance sheets, I see a good many earnings statements, I see a good many costs that are submitted to various plants at different times, and it seems to me that in the parts industry today we are contributing too much to the public. We are selling on a very, very close basis to the automobile manufacturer and the automobile manufacturer is just taking our figures and adding them together into a simple cost and putting a certain profit on and passing it to the public—and we are not the gainer, we are not getting a legitimate profit that warrants us being in business in a great many instances.

I think the principle is wrong. One should increase production by reducing costs, by lowering labor, overhead or material cost, but at the same time to get a living wage is proper. The 71 per cent. of the cars that are turned out here in the United States that sell for a thousand dollars and less that we have created here in the last few years are the mainstay of the automobile industry. Although they are made by only five companies, at the same time in trying to produce that quantity production, we should arrange our material, labor and burden costs in such a way that we can get a living.

It has appeared to me that in a great many instances the competition is too keen, that in trying to get the public to buy we pass something on to the public that it doesn't appreciate, that the saving it makes in the purchase of that car which we should get for the benefit of the capital that is invested in our business is passed on to the owner, so he spends it on paint for his house or on something else. He buys machines on a comparative basis. If all of those machines that are sold, we'll say in the $1,000 class, had $25 more added to them, so that it was on a comparative basis, I think there would be almost as many machines. I mean adding a small amount more to the margin of profit. There is not enough being made by the industry today. The result is that many small companies which produce a small number of vehicles are not able to make the profits that they should in comparison with those that turn out larger quantities.

I believe we should try to encourage a diversification of different types and classes of vehicles to a certain extent. We are the ones who create those customers. I know I speak for many who know that the parts that they submit and that are assembled in those machines make those cars, and those companies that they submit those parts to have not the money to pay for them, but they are continued in existence because we give them either trade acceptances or notes, or deferred payments, until they in turn cancel either the trucks or machines that we have furnished the parts for.

We are making those companies, and *the thought has come up in my mind many times as to whether we are not creating too many of these companies, so that we are weakening the credits that we should have from other companies that are really stronger by creating competition against those companies that would give us more prompt payment and better credits.* I don't think the future of our industry is going to be to try to encourage the greatest number of truck companies possible in the United States, or the greatest quantity of passenger car companies in the United States. *It is to try to have a reasonable number of good companies that can pay their bills, that have some money left in the bank, that are a credit and a going concern risk to the public, the banker and the officers that manage them.* If our companies do not make money for the capital

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invested in them, we are criticized not only by the banks, but we are refused by bankers who would underwrite further the opportunity of gaining more money, so as to extend our business and maybe perfect our business. In order to live, and to live on a sound basis, we have got to make money, because dollars and cents and money is the reward and is the medal of success, and either the banker, the possible shareholder, buyer of bonds or whoever it may be, measures the success of the company entirely by the profits that it makes, and the stock values and the other values are rated accordingly. We are perhaps through the period of liquidation where we were trying to get rid of an excess of material in which we had to encourage people to take it off our hands in order to turn over our stocks; we are past that period, but we should get into a condition where we will only supply goods at a reasonable profit, not an abnormal profit, but a profit of which our shareholders, our bankers and ourselves, in the operation of our organization will be very proud.

Trucks in Milk Distribution

A nation-wide movement favoring milk distribution by motor trucks is now in progress. Reports reaching New York show that Cincinnati now receives 97 per cent of its daily milk supply by trucks; Atlanta, 90 per cent; Kansas City, 40 per cent, Milwaukee, 65 per cent; Los Angeles, 90 per cent; Philadelphia, 64,169 quarts. At one of the principal creameries in Detroit over 9,000,000 gallons of milk were received last year by trucks.

Preliminary conferences to aid the movement along economical lines are now in progress in Philadelphia and Washington. A report on country-wide distribution of milk has been submitted for use in these meetings by the National Motor Truck Committee, National Automobile Chamber of Commerce, to the National Milk Producers' Federation of Washington, which is composed of over 200,000 producers.

This report showed graphically that truck distribution through suburban areas within a radius of from 30 to 50 miles is more satisfactory and economical than other methods of distribution. With the possible exception of New York, Chicago and Philadelphia, the opinion was expressed that producing areas are not located so distantly from distribution points that trucks can not be used in this manner.

In Milwaukee it was shown that 65 per cent of the 30,000 gallons of milk shipped into the city daily arrives in trucks at an annual saving of $17,812. In addition to this, the milk dealers reported that they could handle the milk 5 cents a can cheaper when the milk is brought to them by trucks from the farms than by any other means.

In the retail delivery phase the case was cited of a prominent milk company that motorized its delivery service, 44 trucks replacing 54 retail horse-drawn vehicles at an estimated saving of $24,000.

Texas is leading all other states in the construction of federal aid highways. This state now has 1,382 miles of such highways under construction, and has in addition completed 1,116 miles.

A Place for the Jobber in Parts Distribution

By T. E. CHALLENGER
Credit Manager, McCord Manufacturing Company

BROADLY speaking, I believe the parts maker for whose product there exists any considerable volume of business, is losing a considerable and legitimate profit by confining his sales for service purposes exclusively to the manufacturers to whom his product is supplied for equipment purposes. Of the various channels of distribution to the retail trade I think that only the manufacturer, with a huge volume of business, is justified either in establishing his own branches or in selling direct to the retail trade. The exclusive distributer plan, perhaps, has some unique advantage but usually results in restricted sale and, consequently, restricted service to the vehicle owner and has undesirable reactions in several directions.

Therefore, for the vast majority of parts manufacturers, for whose product there exists a reasonably large volume of business, I believe the well-organized, established and financed automotive equipment jobber offers the most economical, most substantial and most profitable method of distribution. I might add that at present there are in the United States and Canada automotive jobbers—and generally recognized as such—to the number of about 1,700. It is also a fact that the jobber's business has increased rapidly in spite of the fact that some items, like tires and lubricants, are now handled in the main by manufacturers' branch-houses or through specialty distributers.

The demand for replacement parts, such as spark-plugs, gaskets, brake-linings, fan-belts, piston-rings and other items too numerous to mention provides a large and profitable business for the jobbing trade. In addition to this the possibilities for special accessories, such as bumpers, shock-absorbers, motometers, mirrors and other similar items, including shop equipment, have provided an additional field in which the jobber has, naturally and logically, become the dominant channel of distribution.

Just now jobbers throughout the country are engaged in an active campaign toward better merchandising. The "Ask 'em to Buy" and "Ask 'em to Repair" campaigns are being conducted largely through the jobbers and are making better merchants of the supply dealers, and this also applies to the garage and repairmen, all to the ultimate benefit of the accessory manufacturer. These campaigns also have been of very great benefit to the jobbers' sales organizations. Another of the results is that dealers are tying themselves more closely to the jobber, who is teaching them better and more productive merchandising methods. These and similar campaigns, and other good stimulants, mean more efficient jobber distribution, increased business and more substantial accounts for the manufacturers.

One of the vitally important questions with parts makers is that of the potential business in a given territory and how we are to secure it, or reap the maximum harvest from what we may want to, or do, sow. Can we secure our just due more directly and economically and without the aid of organizations, meaning, too, organized efforts, and without acquaintance among the many thousands of dealers and others who are in last contact with the consumer? We might, in a degree, but it would require a mighty organization properly to cover the ground and a mighty expensive one, as well as the other and many elements that would enter into such an undertaking. Even then, we would be under the handicap of being, comparatively speaking, strangers in strange lands, and along with the rest of it we would in fact be jobbers as well as manufacturers. I believe we can not be both and do the job, or both jobs, right. In my judgment, there is where the jobber actually, necessarily and economically fits in.

If these arguments for the jobber are meritorious, then the manufacturer, to secure full advantage of his present or contemplated relations with him, must look well to his sales policy, as in cultivating and developing the jobber's trade this feature is most essential to such up-building and permanency. Another important feature to be considered is that while literally the function of the jobber is to warehouse merchandise for which there is a demand, yet the demand must, in part at least, be created by the manufacturer, certainly developed by him, through sales helps and various forms of advertising too numerous to mention. While, naturally, we would like to have the jobber push our individual line and to a limited extent, accomplish this through advertising helps and other coöperation, yet, on the whole and due to the wide range of merchandise stocked, the jobber obviously can not give any particular line much preferential attention, except upon occasions. He stocks all the lines and supplies the demand the manufacturer creates. I believe we should make him in a way part of our organization. He is performing a service for us that is of great importance and value in the development of our businesses.

$75,000,000 for Georgia Roads

Good roads enthusiasts in Georgia are "boosting" a campaign for a $75,000,000 bond issue which will be used to construct 5,500 miles of a county-seat-to-county-seat state system of roads in the next 10 years. A leaflet entitled "Lift Georgia Out of the Mud," advocating the bond issue, which will be retired through the automobile and gasolene tax, carries the following statement: "With the bond issue, Georgia will be in a position to do in 10 years what it would be impossible to do in 30 years without the bonds. At no time during the life of the bonds is there a period when there is not a balance for maintaining state roads."

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Export Trade Can Be Aided by Banker-Maker Teamwork

COLLATERAL VALUE OF VEHICLES GREAT

"Automotive exports will increase threefold if stimulated by financing facilities based on the collateral value of motor vehicles, deposit by the foreign dealer, insurance of credit risk, and provision for coöperative disposal by the bank and the manufacturer of any rejected shipments," according to G. F. Bauer, foreign trade secretary of the National Automobile Chamber of Commerce, who addressed the Motor & Accessory Manufacturers' Association convention recently. "Motor vehicles represent definite collateral value, just as much as cotton, grain or securities. Recognition of this collateral value has been taken as far as domestic trade is concerned. A recent indication is the erection in Chicago of a warehouse, where motor vehicles may be stored by a dealer as collateral, on which loans are issued.

"In export financing, however, the collateral value of motor vehicles is seldom considered. A draft is discounted only as a firm's standing warrants, regardless of the value that may be represented in the shipment. This attitude is probably because of too little coöperation between the manufacturer and the bank and a lack of understanding as regards each others' problems. Any improvement is, therefore, possible only in a plan that proves satisfactory to both. To the manufacturer it must offer protection from undue recourse; to the banker sufficient collateral and guarantee that the goods will not be thrown on his hands alone for disposal.

"Negotiations are now on between the National Automobile Chamber of Commerce and certain bankers to devise a plan of this kind that will prove satisfactory all around. Based on coöperation between bank and manufacturer, it would provide this:

1—The dealer puts up as a guarantee of good faith 25 per cent. of the value of shipment.

2—The manufacturer discounts the draft for 80 per cent. of its face value, leaving the other 20 per cent. standing until the transaction is completed.

3—The bank insures itself against credit risk and charges the manufacturer a premium of about 1 per cent. for 6 months.

4—The interest on the credit extension is charged to the foreign dealer.

5—The control of the vehicles as collateral guarantee is retained by the bank until payment is effected.

6—The disposal of vehicles, if rejected, is provided for in a coöperative arrangement between the bank and the manufacturer, whereby the latter contracts to give preference to returned goods in filling of any export orders on books.

7—The expenses of returning to the United States of rejected vehicles are amply provided for in the guarantee of 25 per cent. put up by the dealer and forfeited in the event of rejection of the goods for invalid reasons.

"The advantages from such a coöperative financing plan are manifold. The manufacturer is relieved of recourse. The bank avoids going into automobile merchandising and, if desired, could assume the credit risk and collect the premium for its own account. The dealer would have a chance to sell the vehicles before paying the draft; but one-quarter of the present amount would be required to finance the shipment from the factory to the destination; the credit with his local bank could be conserved for use in intensive sales development or in creating a greater turn-over with resultant benefits to all from a larger volume of business.

"If, then, coöperation will help us all in extending our foreign commerce, why not resort to it generally in advertising, selling, and servicing. It certainly ought to enable us to secure for all times 75 per cent. of the world's automotive export trade. The 75 per cent. would also then mean more than now, as the basis would represent a volume of business probably tripled what it is now."

Trucks in California

The following table shows the number of motor trucks, cars and trailers in California on July 31:

County.	Trucks.	Cars.	Trailers.
Alameda	2,348	48,132	139
Alpine	....	24	....
Amador	57	991	1
Butte	308	6,561	68
Calaveras	53	929	1
Colusa	130	2,473	26
Contra Costa	402	7,382	9
Del Norte	32	446	1
El Dorado	100	1,041	....
Fresno	1,719	35,060	149
Glenn	126	2,645	25
Humboldt	331	6,014	14
Imperial	342	7,805	32
Inyo	28	1,293	7
Kern	884	18,004	98
Kings	210	5,316	69
Lake	67	1,053	1
Lassen	28	1,513	3
Los Angeles	10,935	239,739	1,380
Madera	139	2,847	9
Marin	193	3,853	4
Mariposa	29	421	....
Mendocino	230	3,311	2
Merced	227	5,403	33
Modoc	16	948	1
Mono	3	115	....
Monterey	238	5,327	36
Napa	220	3,491	15
Nevada	41	1,210	....
Orange	581	21,410	223
Placer	255	3,821	8
Plumas	48	760	2
Riverside	344	10,695	108
Sacramento	1,206	18,644	89
San Benito	98	2,037	10
San Bernardino	549	15,792	127
San Diego	879	24,387	42
San Francisco	4,977	58,896	178
San Joaquin	922	17,837	150
San Luis Obispo	193	5,504	16
San Mateo	380	5,823	38
Santa Barbara	312	9,367	36
Santa Clara	1,143	21,672	217
Santa Cruz	365	5,878	30
Shasta	175	2,550	8
Sierra	8	231	....
Siskiyou	139	2,929	3
Solano	291	5,818	9
Sonoma	766	12,390	27
Stanislaus	425	12,536	133
Sutter	186	2,493	21
Tehama	111	2,562	12
Trinity	12	194	....
Tulare	694	16,131	195
Tuolumne	57	1,279	5
Ventura	247	6,593	81
Yolo	241	4,252	32
Yuba	147	2,269	12
Totals	35,187	708,097	3,935

The exemption of import duty on trucks, tractors and gasolene is to be declared indefinite by the Mexican government. A decree to this effect has already been prepared and will be published soon.

Novel Highway Maintenance Truck Performs Many Tasks

KERN COUNTY HAS SAVED 55 PER CENT

A novel and very efficient highway maintenance truck has recently been put in service by the board of supervisors of Kern County, California. The machine is built on a standard Fageol heavy-duty truck chassis, and carries all the materials and equipment necessary for maintenance work on concrete, asphalt, macadam, or dirt roads, for the erection of steel, concrete, or wooden bridges, and for the erection and maintenance of fences or signs.

The highway maintenance truck was first demonstrated at the Pittsburgh test highway last spring, and it was received by the highway engineers with great enthusiasm, on account of the multiplicity of uses to which it can be put, and the time and energy it is capable of saving in repair and maintenance work along the roads. Figures supplied by the Kern County board of supervisors show that in some instances the saving is as high as 55 per cent. of the cost under the former system.

The work that this outfit is designed to perform comprises repairing ruptures or breaks in reinforced or plain concrete, macadam, or other forms of streets or highways, using pneumatic jack-hammers to break up the damaged places, pneumatic air-jet to clean out the holes, mixing new cement in power-driven concrete mixer; using materials carried in the bins of the truck, and spreading tar or surface oil over new work; using pneumatic post-hole digger; setting posts in concrete, or tamping the pneumatic tools; painting with the spray outfit; stretching wire with the side arm; painting or whitewashing wooden fences on grades or dangerous turns with the spray outfit; erecting or repairing steel, concrete, or wooden bridges or culverts; hauling materials for them on a trailer; removing old paint or rust from steel work with sand-blast outfit, and repainting with spray equipment; cutting or welding steel work with oxyacetylene outfit; beveling, grading, shouldering up, rolling or draining right-of-way along highways can be done by use of a grading plow attached to the side-arm, or to the rear draw-bar; cutting asphalt pavement with pneumatic chisels or jack-hammer when excavating for sewer pipes, underground conduits, etc. Excavations can be properly tamped with pneumatic tools, and the surface of the street repaired with concrete, surfaced with asphalt, and rolled. A tar tank can be used to keep asphaltum hot.

So successful has the original highway maintenance truck proved in operation that the Fageol Motors Company has added the unit to the regular line, and is offering it to cities, counties, street-railways, and other institutions interested in cutting down the cost of maintaining highways.

In Memphis electric trucks are meeting with increasing favor. Forty-two are in the service of the American Railway Express Company, the Memphis Bread Company has 12, and the Memphis Gas & Electric Company 12.

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City of 2,500 to Be Moved 11 Miles by Truck Train

PLAN INCLUDES HOUSES AND FACTORIES

The Acme Motor Truck Company, of Cadillac, Michigan, has just built a trailer of unusual design that is being used in a unique and unusual job—moving practically an entire village to Cadillac, a distance of 11 miles.

The town of Jennings, 11 miles north and east of Cadillac, was founded about a quarter of a century ago by the Mitchell Brothers' Lumber Company. A saw-mill, chemical, and flooring plant gave employment to approximately 500 men. Various plans were considered for the preservation of the industrial life of the happy and contented little village, but all were discarded. Then was born the idea of moving the mills, the families and the residences to Cadillac. Many plans were considered and rejected as impractical before the motor truck and trailer were considered. Acme engineers studied the problem from every angle, then finally W. A. Kysor, president of the Acme company, submitted a report to the lumber company which was accepted and a gigantic trailer was built. It was such a large size that it had to be built outdoors.

The houses to be moved vary in size from 24x30 feet to 24x40 feet. Many of them have hardwood floors, all are a story and a half high, well-built, comfortable and arranged for convenience. The weight of the houses varies from 15 to 35 tons each. The windows are left in all of them. So perfectly does the trailer function that there is not the slightest jar in any part of the journey and not a window has been even cracked, except in passing through the City of Cadillac, when the limbs of shade trees along the street broke one or two when the first house was brought in.

The 11-mile trip is made in about 4 hours, which includes all necessary stops to wait for traffic to pass before entering upon a stretch of road too narrow to allow passing, though the actual running speed is from 5 to 8 miles per hour. Loading and unloading and passing through the city requires a longer time than that, as it is often necessary to remove the electric light and telephone wires to allow the house to pass under.

At the time this article was written the rate of moving was about two houses every three days or four per week, although as the crew doing the work grows more accustomed to it it is thought a house a day will be brought over. There are from 75 to 100 of these residences to be moved, so the work will require the rest of the year to complete.

The flooring and chemical plant will also be brought to Cadillac, which will result in an increase in population there and make additional homes necessary, there being at the present time a shortage of houses in the city. So Cadillac gains two important industries, from 75 to 100 new houses and from 500 to 1,000 added population, at the same time.

The trailer is constructed with a framework of heavy structural steel beams. A channel and I-beam platform, raised 18 inches above the trailer frame and rigidly connected to it, transfers the load at the forward end of the trailer to a rocking fifth-wheel mounted on the truck. This construction eliminates all twisting stresses from the trailer proper.

The trailer frame is supported at the rear by four steel truck wheels abreast, equipped with solid rubber tires. These steel wheels are placed under the trailer in such a position that approximately 75 per cent. of the weight of the trailer and load is carried on them, thus making it possible to carry a very heavy load on the trailer without overloading the truck used for motive power.

The trailer is designed to carry a maximum nniformly distributed load of 35 tons, and the complete unit weighs approximately 5 tons.

The trailer proper is 24 feet wide by 42 feet long. It consists of five longitudinal members of heavy section structural steel, securely held in place by two main and four supplementary transverse beams. Diagonal cross braces are built into the frame to distribute the stresses where excessive weaving and twisting would occur. To give added rigidity and strength to the structure, the three center longitudinal members are reinforced with large truss-rods securely anchored to the member at each end and supported at equal intervals by cast-iron struts. The tension in these rods is equalized by a series of turnbuckles. All frame connections, gussets, braces, etc., are hot-riveted.

The platform at the forward end of the frame is raised 18 inches above the trailer. It is constructed of channels, I-beams and plates, and substantially braced with diagonal members to the forward transverse member of the trailer proper in order to eliminate side-sway. This platform is connected to the trailer frame by means of heavy gusset-plates and channels of sufficient strength to transfer approximately 25 per cent. of the weight of the trailer and load to the rocking fifth-wheel mounted on the truck.

At the rear the trailer is carried on 4 cast-steel truck wheels, all abreast, equipped with 40-6-inch dual truck tires. The wheels are arranged in pairs, each wheel operating on tapered roller-bearings supported by a tubular steel axle-shaft. The shafts of each pair of wheels are bolted together at the center through a large steel casting which is supported by an extra heavy wrought-iron pipe extending through it and at right angles to the shaft. Heavy steel pillow-blocks at either end of this pipe support the weight of the trailer and load through coil springs attached to the trailer frame. This unique construction not only cushions the load but successfully provides for road inequalities, which is very essential when taking into consideration that the distance between the outside wheels is approximately 11 feet.

To relieve the springs from driving stresses a radius-rod with flexible connections is provided for both sets of wheels, the forward end of which is secured rigidly to the trailer frame while the rear end is fastened to the end of the wrought-iron pipe through a swivel connection.

In order to maintain perfect alignment of all four wheels, the wrought-iron pipes supporting the axle shafts are tied together by a system of flat bars secured to the trailer frame and so arranged as to compensate for spring deflection.

The distance from the top of the trailer frame to the ground is approximately 40 inches when the trailer is loaded.

In loading, the house is raised by a series of jacks located at each side. The two outside longitudinal members of the trailer, which are bolted on, are removed. The trailer is then backed under the building and the house is lowered until it rests evenly on the trailer frame. The side members are replaced if it is found necessary, and the unit is ready for its journey.

An Acme model 125 chassis is furnished with this trailer. It is equipped with a Continental engine which develops 55 horsepower, actual brake test. This power, together with a gear reduction of approximately 7 to 1 in first speed, delivers a tremendous torque at the rear wheels, which is proved by the fact that the outfit was able to climb a 6 per cent. grade 600 feet long over gravel road with a 35-ton load on the trailer.

Blames Motors for High Fares

The most direct cause for the falling off in passenger tarffic on railroads has been the growing competition of hundreds of motor 'bus lines which have been built up in every state in the union, and the millions of privately owned automobiles, declared C. A. Fox, chairman of the Central Passenger Association, representing 166 railroads, in the course of cross-examination before the Interstate Commerce Commission on September 27. This testimony was given in the hearing on the proposed interchangeable mileage plan which is vigorously opposed by the railroads and as strongly supported by the travelers' organizations. Mr. Fox said:

"The fares of the 'bus lines are in some cases lower and in other cases they are the same as or higher than the rail fares, but, regardless thereof, they are a controlling factor in handling this short-haul traffic for the reason they pick up and deliver passengers, taking them from the main streets of the originating points to the main streets at destinations, and the service is so frequent that it diverts traffic from the rail carriers.

"Millions of individually owned motor-cars also make inroads on the local and through traffic of the carriers, which has been lost for some time.

"Instead of any prospective alleviation of these difficulties, the losses from these causes undoubtedly will continue, to grow because of the vast amount of money being expended in every state in the union in the improvement of the public roads.

"For these reasons it is not believed a reduction in fares by means of reduced rate mileage or strip tickets would have the effect of restoring to the rail carriers any considerable volume of this traffic now handled either by 'bus lines or in privately owned automobiles."

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Lumber Truck Saves $2,870.28 Yearly Over Renting

By O. J. VELING

Secretary, Dohn, Fischer & Company, Buffalo, New York

OUR 2½-ton truck costs only $10.62 a day with driver, and saves hiring a truck at $20.00 a day. Thus it effects a net saving of $2,870.28 a year, besides doing the work more satisfactorily. In nearly a year's operation this truck hasn't lost a single day, nor cost a cent for repairs. It has increased our delivery radius from 5 miles to 25 miles, and enabled us to give better service to our customers.

We are in the lumber business, and specialize in mill-work and fine interior trim. We purchased our truck on March 23, 1921, and also use a ¾-ton truck for small loads. The large truck hauls all kinds of lumber from our own cars and mill, and sashes. doors, etc., to contractors all over Buffalo and vicinity. Occasionally it hauls machinery for our plant, or does other odd jobs.

The average load handled by the truck is about 1,500 feet, although it has carried as much as 2,800 feet of yellow pine. While it averages 6 to 7 loads a day during the summer, 4 loads a day is about its average the year round. In delivering to contractors on big jobs we often have straight loads, but other deliveries usually require a number of stops every trip, the average being about 6.

Previous to purchasing the 2½-tonner we operated a 1½-ton and a lighter truck and also hired trucks occasionally. A hired truck of the same capacity as our 2½-tonner would cost $20.00 a day, whereas we can operate our own truck for only $10.62 with driver, saving approximately half the cost. There is also a disadvantage in using hired trucks, in that the drivers do not understand our work. We have split loads, which require peddling lumber from one job to another with 6 or 8 orders on the truck, our own driver knows exactly what to drop off at each place.

This not only insures prompt delivery of the exact material ordered by each customer, but also makes it possible for our own driver to make more deliveries per day than the driver of a hired truck could make. The larger truck has been a profitable investment, both financially and also from the standpoint of service to our customers.

We figure the life of this truck at 6 years, because it is operated carefully. It averages only about 20½ miles a day, so in 6 years it probably will not run over 37,000 miles. Repairs and maintenance have cost nothing so far, as some minor troubles were covered by our guarantee. We look over the truck every week, if possible, and the driver makes all ordinary repairs himself. The truck costs $10.62 a day with driver, 51.5 cents per mile, $1.77 per 1,000 feet, and 69 cents per 1,000-foot mile.

These costs include $4.98 a day for driver, making the cost of the truck itself only $5.64 a day. The driver is paid more than $4.98 a day, but he averages only seven-eighths of his time on the truck, so only that amount is charged against it. The remainder of the time he works about the mill.

Up until 5 years ago we used horses, but we have abandoned them in favor of trucks. Our business used to be confined to a 5-mile radius, which the horses could handle; but business keeps moving farther away, and with trucks we can handle this long-distance business and reach out for more. Deliveries to points such as East Aurora and Tonawanda would be impossible with horses, because the distance is about 30 miles.

OPERATING RECORDS.

Total Period.

Period covered	10⅓ months
Days operated	261
Total round trips	1,044
Deliveries, pickups	6,264
Total loads, 1,000 feet	1,566
Miles traveled	5,378
Gasolene, gallons used	1,080
Cylinder oil, gallons used	33¾

Daily Averages.

Round trips	4
Deliveries, pickups	24
Total loads, 1,000 feet	6
Miles traveled	20.6
Miles per round trip	5.1
Load per trip, 1,000 feet	1.5
1,000 foot-miles (6,000 feet hauled 2.55 miles)	15.3
Miles per gallon gasolene	5
Miles per gallon oil	159

COST RECORDS.

Investments.

Chassis, etc., complete	$3,267.79
Tire value	235.50
Total, less tires, to be depreciated.	$3,032.29

Fixed Charges—Yearly.

Interest on total investment (6 years at 6%)	$ 114.37
Taxes and licenses	30.00
Insurance	196.00
Garage expenses	120.00
Total per annum	$ 460.37
Total per month (per day $1.53)	38.36
Total for period—10 1/3 months.	400.19

Variable Charges—Period.

Fuel at 24 cents a gallon	$ 259.20
Cylinder oil at 80 cents a gallon	27.00
Tires—5,378 miles ($235.50 ÷ 15,000-mile life)	84.43
Depreciation—5,378 miles ($3,032.29 ÷ 37,000-mile life)	440.99
Maintenance and repairs (estimated)	260.78
Total variable charges (per day $4.11)	$1,072.40
Driver's wages (per day $4.98)	1,299.38
Total fixed charges	400.19
Total operating costs	$2,771.97

Unit Costs.

Cost per day operated	$ 10.62
Cost per mile traveled	.515
Cost per 1,000 feet hauled	1.77
Cost per 1,000 foot mile	.69
Repair cost per mile—estimated	.049
Repair cost per mile—actual	.000

Bearings Service Company Dissolved

The Bearings Service Company, incorporated June 26, 1916, to act as the service department of the Timken, Hyatt and New Departure bearing companies and maintaining 32 branches and practically 1,000 distributers, will be dissolved December 31, 1922, according to its president and general manager, Alfred K. Hebner.

"Although the same mutually friendly attitude exists among the manufacturing principals through whose efforts the Bearings Service Company was brought into existence, with automotive service activities and policies becoming more and more important in the industry as they have during the past several years, there has been a growing mutual realization between the Timken Roller Bearing Company and the General Motors Company, whose interests have been represented in the Bearings Service Company, that the best ultimate goal would be secured by each through a separation of their bearings service program," says Mr. Hebner. "To this end on and after October 1, 1922, the servicing of Hyatt and New Departure bearings, the manufacturers of which are units of the General Motors Corporation, will be handled by the United Motors Service, Inc., and a new company to be known as the Timken Roller Bearing Sales & Service Company will care for the servicing of Timken bearings.

"Until January 1, 1923, when the Timken Roller Bearing Sales & Service Company will be in operation, the Bearings Service Company will continue the servicing of Timken bearings as heretofore at all its 32 direct branches located in the following cities: Atlanta, Boston, Chicago, Detroit, Los Angeles, Minneapolis, New York, San Francisco, Seattle, Kansas City, Dallas, Cleveland, Denver, Indianapolis, Birmingham, Richmond, Philadelphia, St. Louis, New Orleans, Pittsburgh, Omaha, Portland, Toronto, Winnipeg, Brooklyn, Fresno, Milwaukee, Salt Lake City, Baltimore, Buffalo, Newark, Oklahoma City. In addition in any of these cities where the United Motors Service, Inc., does not have branches the Bearings Service Company's branches up to January 1, 1923, will sell for service Hyatt and New Departure bearings.

"To indicate the continued mutually friendly attitude in service affairs between the manufacturers of Timken, Hyatt and New Departure bearings, the United Motors Service, Inc., will appoint as service distributers of Hyatt and New Departure bearings, the direct branches of the Timken Roller Bearing Sales & Service Company, in cities where the United Motors Service, Inc., has no direct branches and conversely the Timken Roller Bearing Sales & Service Company will appoint direct branches of the United Motors Service, Inc., as its service distributers for Timken bearings in such cases. These arrangements will result in the public obtaining just as good if not better, service on all these three bearing lines, Hyatt, Timken and New Departure, than has been available in the past through the Bearings Service Company."

By using a 2-wheeled dirigible trailer of the type described in these columns in April of this year an English lumber concern was able to deliver a 5-ton beam 52 feet in length through crowded city streets without trouble. Although the distance between the truck's rear axle and the center of the trailer was 33 feet, there was no difficulty in making the wheels of the latter track with those of the truck.

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Long-Distance Moving by Truck

By T. B. LANCASTER

MOVING day. What a nightmare it has always been. Unfortunately, it could not be confined to one day, but covered many days. If the moving was from one city to another the time required for this most distasteful of all household work might run into weeks.

First, the packer. Everything had to be packed or crated. Then the mover came, and hauled the goods to the freight-station. Those who have moved from city to city can well remember how the old freight agent would inspect the various articles, instructing that this item had to be uncreated, the goods repacked and recrated in order to get the shipment "under so many inches." After you were able to "get by" the rules and regulations, the goods were loaded, along with other less-than-carload shipments. After the car had been loaded and sealed, the engine switched it around for a while, and finally it found its place in a long string of freight-cars. Probably by this time the household goods and other less than carload shipments were pretty thoroughly mixed.

The car finally reached destination. Maybe the household goods had been transferred a time or two *en route*. Of course, it was necessary to load them on a truck or van at destination and haul them to the new home. In turn, they must be unpacked and put in place. What a job this was! Usually some things are found to be missing, others broken, and most likely the very best of the furniture had a big scratch right across it.

W. B. Hiner, general manager of the Red Ball Transit Company, had experienced these days of moving hardships. Mr. Hiner had a vision of betterment in service, both in the method of transportation and in the time required to effect delivery at destination. He foresaw the saving he could bring to the owner of the shipment, not alone in rates, but in loss and damage, as well as annoyance. Mr. Hiner realized that the way to change moving day was really to move. All this old-time lost motion just meant that much more delay and damage to the goods. He conceived the idea of placing the goods in a truck and taking them directly to destination, regardless of distance.

After working out his plans, organizing the Red Ball Transit Company, with general offices at Indianapolis, Mr. Hiner visited the truck factories to see if they could furnish the equipment necessary to make this new business a success.

As a consequence he placed an initial order for 3-ton trucks equipped with special, fully inclosed van bodies.

The success of Mr. Hiner's company was assured from the start. Today you can see their special U. S. trucks on the highways everywhere covering Illinois, Wisconsin, Iowa, Missouri, Indiana, Michigan, Ohio, Kentucky, West Virginia, Pennsylvania, Maryland, Delaware, New Jersey and New York.

The Red Ball Transit Company has offices in the principal cities of these states, and in addition to its main office at Indianapolis, has branches in Cincinnati, Columbus, Dayton, Toledo, Cleveland, Detroit, Chicago, Washington, Pittsburg, Philadelphia and New York City.

This company has successfully established a unique and economic system of motor transportation of household goods, which effects rapid deliveries requiring long-distance hauls. In short, it has eliminated the lost motion; that is the whole story.

With its various branches, it is always able to arrange return loads so that the trucks never run empty. As a consequence, rates are kept down to a very reasonable figure. One of the principal advantages of this company's plan is that there is no packing or crating of household goods necessary before loading. Consequently there is no uncrating and unpacking after delivery. The goods are placed in the new home ready for use. What an appeal this system carries to the householder! Again there is no transfer at division points, where, with railroad shipments, so much delay and damage occurs.

When a moving contract is made with the company, a Red Ball truck backs up to the door of the old home. The bric-a-brac and other furniture are removed; curtains and shades are taken down and all packed in these special, fully inclosed vans, where heavy blankets and pads securely protect them and prevent any chance of damage. The company guarantees safe delivery at destination, the household goods are insured, and all the owner has to do is to see to it that the truckmen can enter the new home after they arrive at destination. Before the goods are placed in position inside the house, they are wiped off and polished, then put in place ready for immediate use by the owner.

One of this company's more recent record deliveries was a convoy of trucks making the trip from Indianapolis to New York City. On February 3rd, there were centered in Indianapolis eight trucks loaded with household goods, and these were formed into a convoy attended by a truck loaded with supplies, accompanied by a convoy manager and an observer.

The convoy was routed Indianapolis to Dayton, Ohio, and maintained an average speed of 15 miles per hour. Dayton to Columbus, Ohio, was covered at an average speed of 16½ miles. From Columbus to Wheeling, West Virginia, the average speed was cut down to 8½ miles per hour, for, owing to hills and bad weather, first and second speed traveling was necessary. Wheeling to Pittsburgh was covered at an average of 11 miles per hour. From Pittsburg the route lead over the Alleghany Mountains, which were covered with snow and ice, to Gettysburg. On this section the thermometer registered 6 degrees below zero. While these conditions prevented making any speed tests, they did not hamper the steady movement of the fleet. From Gettysburg the route was via Baltimore, Philadelphia, Newark, Jersey City to New York.

For educational purposes and publicity, the trucks paraded in cities and towns through which they passed and attracted marked attention. More than 1,000 miles were traveled, yet the total time lost for adjustments and repairs on all trucks was but 5 hours. Despite the fact that it was at the worst season of the year with roads at their poorest, no accident to trucks, loads or operators occurred.

The consumption of gasolene and oil by the entire fleet was economical, when road conditions, time of year, and other difficulties are taken into consideration.

The return trip of the "pacemaker" truck, from New York to Indianapolis, with full load, was made in 40 hours' running time. Within 72 hours after the trucks left New York they were in Indianapolis, with everything in good condition.

It means much to be able to get away from the extreme annoyance of moving time. Motor trucks have shown their real worth in helping to meet and solve these conditions.

White Company Dividend

In paying the 27th dividend on its stock the White Company announces that similar dividends have been paid without interruption every quarter since the company was organized. The earnings from January 1 to August 31 have comfortably exceeded dividend requirements for the entire year, and the volume of orders on hand and in prospect indicates a continued improvement in business. The ratio of current assets to current liabilities is now five to one. Outstanding loans are only $500,000 and the company has not discounted any customer's paper.

It is employing 3,776 men in the factory, and is producing on a basis of 10,000 trucks a year.

On September 1 the general offices were removed from Euclid avenue to the plant, and all officers are now located in one building, which greatly facilitates the prompt and economical handling of our business.

The constantly recurring rumors of a proposed consolidation of this company with one or more other companies are without foundation in fact. It is the present judgment of the directors that a consolidation would not benefit the company," says the company's statement.

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British Trade Body Condemns Price-Cutting Policy

By OBSERVER

THE establishment of a one-price system, when properly regarded, is not a matter for argument but a matter of elementary economic necessity. Those who deny the primal justice and equity of the demand for it do so because, consciously or unconsciously, their ideal is commercial injustice and industrial immorality. They can only translate their theories into practice at the expense of the remainder of their section of the producing and distributing community. If every dealer adopted their methods, commercial chaos must result. They are against the even keel in trade. They are economic anarchists. So speaks a writer in *Motor Commerce*, the official organ of the Motor Trade Association in England.

The plea of the price-cutter that his operations are in the best interests of the purchaser is the plea of dishonesty or ignorance. The dishonest are after quick profits before chaos ends inevitably in monopoly and the public disadvantage. The ignorant lose sight of the fact that inadequate gross profit is ultimately a net loss. It is untrue to say that the private purchaser's interest is ignored or sacrificed by the one-price system. A fixed price is the only guarantee of an equitable deal for buyer and seller alike. Efficient distribution is supremely important to the public who need to procure goods everywhere and always. It is the rankest hypocrisy to pretend interest concerning the public good if by price-cutting and the financial slaughter of distributing forces, the public is robbed of that highly valuable service.

Competition settles and fixes prices. The one-price system does not and can not interfere with competition. On the contrary it induces and fosters competition. The one-price system is a vindication of the manufacturer's inalienable right to indicate the net value of the goods for which he is responsible. The public's right to refuse to buy these goods if the price is unsatisfactory is likewise inalienable.

On the one hand, competition for the market must prevent the manufacturer placing an artificial price upon his goods. On the other hand, and under any circumstances, prices could not be advanced beyond the purchasing power of the market. In both cases the liberty of the public to buy or not to buy is insured.

From the retail agent's point of view the case does not differ in essence. There is no need to discuss the position of the agent who definitely contracts to sell goods at a fixed price and then directly or indirectly sells above or below that figure. He is both a thief and a rogue.

In relation to the manufacturer the retail agent is in precisely the same position as the public. He buys, or he does not buy, according to how he judges the market for certain goods at particular prices. To deviate from the manufacturer's fixed retail price is first of all to interfere with the rights of the manufacturer, who often has spent years of effort and enormous sums of money in producing the article, and who is quite entitled to put his own retail valuation upon it. In the second place, to cut the price is to suggest that the manufacturer has too generously set the agent's margin of profit. In the third place, it is to interfere with the distributing organization by putting the smaller agent, who has not an outside and independent trade in goods, the price of which is not cut, out of business. The small dealer is an absolute necessity to the manufacturer and the public, who both depend upon a wide and efficient distributing organization.

The margin of difference between wholesale and retail price is, and must be, the exact margin necessary to remunerate a selling agent for his services of distribution. When an agent "cuts price," it suggests that the margin of difference between wholesale and retail prices is too great. Eventually the manufacturer must reduce that margin or stop supplies of his goods to the price-cutter, in either event involving loss to the agent.

The manufacturer who does not care what price his goods are sold for after he has disposed of them to the agent is committing commercial suicide. He destroys the proprietary value of his article and destroys the public confidence in it, because with inconstant and varying prices the public can never be sure it is not being robbed, and can not be quite certain it is getting the goods it is supposed to be buying. It is manifestly unfair that one agent should have a retail price advantage over another agent selling exactly the same goods. It makes the article unprofitable from the point of view of the majority of agents, and wrecks the distributing service of the manufacturer.

The two legitimate sources of additional profit for the large agent are as between himself and the manufacturer, to whom he renders greater service by selling more goods than the small agent can sell; and as between himself and the public whom he can attract by wider and more effective means of publicity in conjunction with ampler general service.

To cut prices is to cut competition, not to maintain it. A sales monopoly is quite as bad as a manufacturing monopoly. The agent who, by underselling, rids himself of the competition of other agents, is robbing the public of service and the manufacturers of sales. The manufacturer has only himself to blame if he allows it, and the cutting agent has only himself to blame when the manufacturer discovers the mistake and proceeds to cut him out!

The one-price system is the hallmark of proprietary value. It standardizes both the commodity and the trade in it. Other things being equal, the public will even pay a little more for a known article of constant price. The public will not so confidently buy an article the price of which varies at every shop. There is no guarantee of value in such fluctuations.

Sales are facilitated by the one-price system because there is no occasion to waste time in haggling, or need to disorganize the sales department by calculations in cutting and by the cheating, lying and misrepresentations which inevitably accrue therefrom.

Where buyer and seller know that every article of a particular brand is identical in quality and price, there is certainty and mutual satisfaction.

The one-price system means a fair, equitable and honorable transaction.

Novel Rolling Dump Body

A most unusual type of dumping body has been placed on the British market under the name of the Shirreff Timesaver. It dumps its load in much the same manner as the bottom-dump contractors' wagons so well known in this country, but the load can be discharged free of the chassis and at the rear or at either side.

The floor of the body is made in sections, each at its forward end pivoted at each side to an angle-iron running along the bottom of the body sides. By this floor the body is supported on rollers mounted on an independent framing, along which the body can be drawn by a simple form of windlass through the medium of a wire rope passing over rollers at each end of the frame. The latter is, of course, stationary on the chassis.

In load-discharging, as soon as the body is released from its safety catches, it is drawn backwards along this frame, and as each floor section passes beyond the support of the frame rollers it falls by gravity, discharging the load more immediately above it. Thus the body gets rid of its load almost as fast as, by being traversed backwards, it loses the support of the frame. For the rest, the overhanging weight is merely represented by the empty body.

The tail doors are very strongly hinged to the rear pillars of the stationary framing instead of to the body, and thus, as soon as they are unlocked by the lever, the body on being traversed at once throws them open as it passes backwards. Now on the inside of each door towards its outer edges is fitted a roller at such a height as to be immediately below the level of the projecting flange of angle-iron fitted right along the side of the body. When more than half the body length is projecting beyond the supporting underframe the natural tendency for it to tip is checked by this roller. Further attention should be called to a small pair of rollers at the front of the body on each side. When the body reaches a certain point in its travel, these rollers enter between two channels placed hollow to hollow, and any further tipping tendency of the body is checked by these rollers coming into contact with the upper flange of the channels.

The angle-iron which rests on the tail-door rollers also serves another purpose, for, in conjunction with the bottom angle on which the floor sections are pivoted, it enables the sides to be made of short, stiff, vertical instead of longitudinal planking and

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this affords a construction less liable to be bulged outwards by heavy loads. And these angles have yet another use, for mounted on the pillars of the underframe on each side are rollers bearing against the angle plate, so that if the body has to be discharged when transversely inclined, as for example, on a sharp chamber, any resulting side-thrust is taken on these rollers, and, as the body is traversed along its frame, the angle-iron offers a convenient path to the said rollers.

The body runs very easily along its underframe rollers, and, therefore, for tipping on a hill steep enough to give the body a marked tendency to run too far along the underframe, a check is provided in the form of a sort of brake which merely consists of a couple of eccentrics mounted on a cross-shaft that can be turned by a lever so as to bring the eccentric throws upwards to bear hard against the underside of the body, the position of the eccentrics being such that the greater the tendency of the body to run backwards along its underframe, the greater the upward pressure.

With the body at its extreme outward travel, too, the action of the struts in strengthening the supporting tail-doors will be appreciated, but this is not the main purpose of these struts, which are primarily intended to afford additional support in side discharging.

This brings us to the framing and its turntable on which the body is centered, so that it can in general easily be swung round by head. In addition to the turntable a quadrant plate toward each end helps to take the weight and steady the body, but obviously for side discharging only little of the overhanging weight can be taken by these plates. Accordingly the tail-door struts are uncatched, swung downward on their hinges, and, being telescopic, can be extended to bear on the ground, the extensions being firmly held in position by set screws.

With the floor thus made in sections, the general arrangement lends itself extremely well to quick discharging bodies of the compartment type, for there is manifestly no difficulty whatever in inserting in the body partitions reaching down to the dividing lines between the floor sections. In some businesses, as, for instance, those of building contractors, such an arrangement, in conjunction with the discharging facilities, possesses peculiar advantages, in that sand could be carried in one compartment, lime in another, hard core in a third, and so forth.—*Motor Transport.*

Minnesota's Road Work.

Minnesota highway work during 1921 benefited 3,393 miles of main routes, while patrol and maintenance service was given on 6,885 miles of the 7,000-mile system of state trunk highways, 765 miles of grading and 497 miles of gravel-surfacing were added to the respective 1,499 and 1,371 miles totals listed as graded and graveled when the state took over the trunk routes for improvement and perpetual up-keep. In addition state maintenance forces reshaped 1,137 miles and resurfaced 885 miles on the trunk system. The Minnesota Highway Department last year planned and supervised projects representing an outlay of $19,321,238.60.

Country Gasolene Delivery Costs One-Half Cent a Gallon

By G. W. HARVEL

Delray, Florida

MY 1½-ton truck has operated two years without losing a single day for repairs. It costs only $9.95 per day with driver, or 24.88 cents per mile. Whether making a 70-mile run into the country, or delivering about town, it is always on the job. My business is the retail delivery of gasolene and oil to garages, stores, private owners, and others having passenger-cars and trucks. On March 24, 1920, I bought a Selden truck for this work, and had it equipped with a steel tank body holding 455 gallons. There are three compartments, two for gasolene and one for kerosene. The truck handles this load so easily that I am going to put on a 600-gallon tank.

The truck starts out early in the morning on a regular route, going through Hyploxa, Boynton, Delray, Yamato, Bogratone and Deerfield. It also goes out into the country to various small places, serving a total of 90 to 100 customers. It averages 4 trips and 30 stops a day, serving some customers twice a week and some twice a month; the garages are served practically every day.

The truck usually hauls nearly 450 gallons of gasolene, and about 10 gallons of oil in 5-gallon cans. The roads around here are good, with no hills, and the truck sometimes makes 70 miles a day. On other days it runs about town, making not over 20 miles. The average is 40 miles a day. The truck usually makes out-of-town trips four or five days a week, and short local trips one or two days. It works about five Sundays in a year.

I usually drive the truck myself and keep it well greased. Twice a week I look it over and tighten all parts that need it. I never speed with a load on, 18 miles being the maximum, empty, and 10 miles with a load.

Maintenance takes four or five hours of my time each week. This is covered in the allowance of $200.00 a year, which also includes painting the cab and general overhaul. In two years' operation the truck has not lost a day for repairs, and the total actual repair expense has been only $9.08—$7.08 for bushing and $2.00 for a couple of valves.

This truck should easily be good for a minimum life of 50,000 miles, giving about four years of service. It costs $9.95 per day with driver, 24.88 cents per mile, 5.5 cents per gallon, and 1.1 cent per gallon-mile. If we take out my allowance of $3.86 for driver, the cost per day is only $6.09.

OPERATING RECORDS.

Total Period.

Period covered	2 years
Days operated	622
Total round trips	2,434
Deliveries, pickups	18,660
Total loads, gallons	1,119,600
Miles traveled	24,880
Gasolene, gallons used	2,488
Cylinder oil, gallons used	155½

Daily Averages.

Round trips	4
Deliveries, pickups	30
Total loads, gallons	1,800
Miles traveled	40
Miles per round trip	10
Load per trip, gallons	450
Gallon-miles	9,000
Miles per gallon gasolene	10
Miles per gallon oil	160

COST RECORDS.

Investments.

Chassis, etc., complete	$3,003.00
Tire value (pneumatics)	430.40
Total, less tires, to be depreciated	$2,572.60

Fixed Charges—Yearly.

Interest on total investment (4 years @ 6%)	$ 112.61
Taxes and licenses	30.00
Insurance	22.00
Garage expenses	72.00
Total per annum	$ 236.61
Total per month (per day $0.76)	19.72
Total for period—2 years	473.22

Variable Charges—Period.

Fuel at 27 cents a gallon	$ 671.76
Cylinder oil at 45 cents a gallon	69.98
Tires—24,880 miles ($430.40 ÷ 12,000-mile life)	893.19
Depreciation—24,880 miles ($2,572.60 ÷ 50,000-mile life)	1,281.32
Maintenance and repairs (estimated)	400.00
Total variable charges (per day $5.33)	$3,316.25
Driver's wages (per day $3.86)	2,400.00
Total fixed charges	473.22
Total operating costs	$6,189.47

Unit Costs.

Cost per day operated	$ 9.95
Cost per mile traveled	.248
Cost per gallon hauled	.005
Cost per gallon-mile	.001
Repair cost per mile—estimated	.016
Repair cost per mile—actual	.0004

601-Mile Test for 'Buses

Six hundred and one miles across two great states, over all kinds of roads, and in wet as well as dry weather—that was the severe test to which 5 new 2½-ton model 52 International 'buses were subjected before being turned over to the purchaser. The trip from Omaha to Chicago was begun Saturday, August 26, 730 P. M., and was concluded Thursday afternoon at 4 P. M.

The day following their arrival in Chicago the 'buses were turned over to the West Suburban Transportation Company, which recently obtained a franchise from the Illinois Commerce Commission to operate a 'bus line between Cicero and Hinsdale, Illinois, thriving suburbs to the west of Chicago. The distance between these two towns is only 10 miles, but on an east-and-west line between these towns are seven other prosperous suburbs which the company is planning to serve on a 20-minute headway. Although each 'bus has a seating capacity of 30 passengers, the 'buses quickly proved popular and frequently are crowded to the full carrying capacity. The 'buses are attractively finished and have a length of 226 inches behind the dash. They are designed for a maximum capacity load of 5,000 pounds. The chassis weight is 4,750 pounds.

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Removes Colgate's Ashes at 32 Cents a Cubic Yard

REPAIRS COST ONLY 2.1 CENTS A MILE

Nearly everyone has heard of and perhaps used the Colgate products, but very few ever stop to think of the processes of manufacturing back of these toilet goods. It is an interesting study, even to the removing of lime and ashes from the big plant at Jersey City, New Jersey.

This refuse comes down into chutes which fill up over night and must be emptied in the day-time. This job has been given to Thomas J. Nolan, a well-known trucking contractor of Jersey City. As Nolan says, "It is up to our trucks to keep these chutes empty and this is a difficult job, requiring steady running."

The Colgate contract is Nolan's biggest job and he employs motor trucks to handle it. "We can depend on them to be on the job continuously," he says. "This is very important because if a truck breaks down, we usually have to hire two trucks to take its place." But the lime must be carried away promptly, regardless of this expense if he is to hold his contract.

The refuse is hauled from the plant to a dump which is about two miles away. The load is bulky although light, but the streets are paved with cobblestones, hard on both truck and tires. The trucks make 10 round trips a day, carrying 70 cubic yards each, or an average of 7 cubic yards per trip.

The cost of this work is made up of $2.99 fixed charges, $13.73 variable charges, $5.99 drivers' wages, a total of $22.71 per day per truck. As the truck travels but 42 miles, the cost per mile is rather high—54 cents—but the cost per cubic yard is reasonable at 32 cents.

Here is an excellent example of trucks building up a successful cartage business. The Colgate Company would not hesitate to place its contract elsewhere, if Nolan's trucks did not stay on the job. The trucks have averaged but 2 days per year out of service and this includes time off for repairs and overhaul.

Mr. Nolan estimated approximately $670 per year repair costs, which would be 4.7 cents per mile. The actual cost was but $300 or 2.1 cents per mile, a direct saving of 2.6 cents per mile or $370 per year on repairs alone.

As the annual license fee on each truck is $50.00, this saving of $370.00 in repairs will pay the license and the interest on the investment, $216.00, and still leave a margin. Mr. Nolan keeps a careful record of all expense in connection with these trucks.

Tractor and Trailer Information

The Detroit Trailer Company, Detroit, acting in concert with the General Motors Truck Company of Pontiac, Michigan, has just issued a very interesting catalog entitled "Modern Freight Transportation" in which tractor-trailer haulage equipment of the most modern type is shown. This is the first time, as far as is known, that such a method of presenting tractor and trailer information has ever been adopted, and the concerns involved are to be congratulated on the result attained.

The catalog contains illustrations and descriptions of the full line of GMC tractors and Detroit trailers. The former include three models K-41T of 5-ton rating, K-71T of 10-ton rating, and K-101T of 15-ton rating. All are fitted with the GMC 2-range transmission providing 8 forward and 2 reverse speeds. All use the GMC engine, multiple-disk clutch, metal wheels, worm-gear axle and solid tires.

The trailer line includes semi-trailers of from 3- to 15-ton capacity, drop-frame semi-trailers of from 4- to 15-ton capacity, a 20-ton 4-wheeled semi-trailer, pole trailers of from 1- to 6-ton capacity, 4-wheeled non-reversible high-speed trailers of from 2- to 7-ton capacity, 4-wheeled reversible high-speed trailers of from 1- to 7-ton capacity, and gravity drop-frame dumping trailers of from 2- to 7-ton capacity. There are also the Detroit fifth-wheel and the Detroit swivel bolster. Illustrations show Detroit trailers designed for use by public service companies, motor haulage concerns, and for carrying steel, lumber, live-stock, automobiles, coal, building materials, etc., by means of open and inclosed bodies of wood or metal. The Detroit Trailer Company is also equipped to build bodies of all kinds, including gravity dump and rack and stake, wood and fire-proof bodies being a specialty.

Motor Truck and Passenger-Car Production

The following figures show the annual and monthly output and shipments of motor trucks and passenger-cars and index numbers showing (a) the relation between each month's output and the average monthly production for 1919 taken as 100 and (b) the relation between each month's shipments and the average monthly shipment for 1920 taken as 100.

	NUMERICAL DATA					INDEX NUMBERS				
	Production.		Shipments			Production.		Shipments		
Year and Mo.	Trucks.	Cars.	By Rail-road.	Driven Away.	By Boat.	Trucks.	Cars.	By Rail-road.	Driven Away.	By Boat.
1913 monthly av.	1,958	38,458	....	....	....	7	28	...	...	...
1914 monthly av.	2,115	45,307	....	....	....	8	33	...	...	...
1915 monthly av.	6,167	68,218	16,048	....	....	23	49	77	...	...
1916 monthly av.	7,500	124,468	22,598	....	....	28	90	108	...	...
1917 monthly av.	10,680	145,066	22,462	....	....	41	105	107	...	...
1918 monthly av.	18,938	77,199	13,456	....	....	72	56	64	...	...
1919 monthly av.	26,364	138,138	23,726	....	....	100	100	113	...	...
1920 monthly av.	26,837	156,930	20,922	39,239	4,698	102	114	100	100	100
1921 monthly av.	12,090	127,916	16,263	12,031	1,854	46	93	78	31	39
1920.										
May	.....	.....	21,977	74,286	....	...	...	105	189	...
June	.....	.....	22,516	60,746	8,350	...	...	108	155	178
July	.....	.....	23,082	52,342	8,702	...	...	110	133	185
August	.....	.....	23,386	34,060	7,095	...	...	112	87	151
September	.....	.....	20,804	24,431	5,469	...	...	99	62	116
October	.....	.....	17,209	14,127	2,519	...	...	82	36	54
November	.....	.....	13,253	9,497	659	...	...	63	24	14
December	.....	.....	11,802	6,469	89	...	...	56	16	2
1921.										
January	.....	.....	6,485	3,185	93	...	...	31	8	2
February	.....	.....	9,986	7,507	99	...	...	48	19	2
March	.....	.....	16,287	9,939	75	...	...	78	25	2
April	.....	.....	20,187	14,197	1,619	...	...	96	36	34
May	.....	.....	18,608	15,193	2,381	...	...	89	39	51
June	.....	.....	20,269	18,834	3,947	...	...	97	48	84
July	10,766	165,574	19,514	15,533	3,726	41	120	93	40	79
August	13,080	167,705	20,758	15,218	3,595	50	121	99	39	77
September	13,648	144,669	19,002	13,840	2,959	52	105	91	35	63
October	12,813	134,734	17,717	12,926	2,214	49	98	85	33	47
November	10,010	106,042	14,240	10,505	1,402	38	77	68	27	30
December	8,307	70,690	12,100	7,500	134	32	51	58	19	3
1922.										
January	9,358	81,693	15,357	7,479	143	35	59	73	19	3
February	13,133	109,170	19,636	10,173	180	50	79	94	26	4
March	19,665	152,959	27,753	16,917	560	75	111	133	43	12
April	22,237	197,221	31,334	22,381	2,960	84	143	150	57	63
May	23,694	232,431	34,324	28,760	7,366	90	168	164	73	157
June	25,982	263,008	33,000	30,500	7,900	99	190	158	78	168
July	21,243	223,201	.....	.....	.....	81	162	...	...	...
August	24,064	246,941	.....	.....	.....	91	178	...	...	...

Solid Tire Production

The following figures show the changes in solid tire production by years and months, the index figures being based on the average monthly output for 1921 which is taken as 100:

	NUMERICAL DATA			INDEX NUMBERS		
1920—	Production.	Stocks.	Shipments.	Production.	Stocks.	Shipments.
November	21,355	298,875	34,217	60	129	78
December	16,297	303,473	40,828	46	131	93
1921—						
January	21,220	303,753	29,116	60	132	66
February	23,355	304,374	29,599	66	132	67
March	28,710	283,800	43,926	81	123	100
April	28,859	269,985	42,080	82	117	96
May	35,156	264,633	40,122	99	115	91
June	28,395	240,336	49,867	80	104	113
July	35,123	220,003	55,678	95	95	127
August	55,694	216,367	66,866	158	94	152
September	37,441	161,832	50,276	106	70	114
October	46,274	163,299	45,911	131	71	104
November	45,537	173,451	34,556	123	75	79
December	40,478	168,515	39,520	114	73	90
Total for year	424,242	.....	527,517	...	...	...
Monthly average	35,354	230,862	43,960	100	100	100
1922—						
January	40,224	181,769	33,294	114	79	76
February	39,492	183,448	36,805	112	79	84
March	49,433	182,197	48,350	140	79	110
April	46,664	173,748	52,309	132	75	119
May	57,640	170,904	60,711	163	74	138
June	66,089	169,808	63,408	187	74	144
July	72,000	176,000	60,000	203	75	136

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Shipping to Coast by Water

The Automobile Dealers' Association of Portland, through its secretary, Ralph J. Staehli, has been securing data relative to water shipments of motor vehicles and has reached the conclusion that a substantial saving can be made in this manner, which can be passed on to the ultimate purchaser. He says:

"Owing to the fact that the railroads coming into Oregon charge a higher car-load minimum than for California, the Pacific Northwest bears freight rates on automobiles in many instances considerably higher than California, and in fact the highest in the country. There being no prospect of freight reduction, and the railroad situation being altogether unfavorable on account of strikes, the Portland dealers have been investigating water shipment and many of them are on the point of trying it.

"Under the railway freight schedules the cost of cars, particularly closed models, has been increased sometimes as much as 20 per cent. By shipping by water we believe that this can be considerably reduced. A saving of one-third of the freight charge would be possible, our investigations have disclosed."

The machines could be handled from the eastern and middle western factories to the Atlantic seaboard by rail or canal, it is stated, and then brought through the Panama Canal to the Pacific Coast. While such shipments would take a considerably longer time than by rail, this delay would not be such an undesirable factor during the fall, winter and early spring months, although dealers would no doubt resort to rail shipments during the spring and early summer rush of buying.

German View of American Transport

"If one had been more concerned about the United States and known more about its gigantic power, it is possible that things would have been different from what they are now," said Dr. R. Allmers of the Hansa-Lloyd Werke, Bremen, Germany, in his preface to the translation which he has made of "Facts and Figures of the Automobile Industry—1921," the statistical review of the year published annually by the National Automobile Chamber of Commerce.

Dr. Allmers points out that the development of motor transportation has had a significant part in America's development and suggests that a stimulation of the industry there would help his country to economic recovery.

"Now that the Fatherland is poverty-stricken," says Dr. Allmers, "the task for us men of deeds is to build it up again. In this connection it can be of use to know by a closer survey of conditions in the automobile industry that a large field for development is still open to us Germans. But the statesman also can learn from this book. He can learn of the great economic significance which this medium of transportation has, despite the fact that such significance is not generally realized, and what he must do in order not to obstruct it, but rather to encourage its development."

Department Store Haulage Costs 4.45 Cents a Package

By E. D. BURDEN

Secretary, Burden & Company, Brooklyn, New York

WE can't say too much for the dependability of motor trucks. We are operating some of the largest department stores in Brooklyn. Our light delivery work is handled by a fleet of light trucks, and our heavy work by a 1¼-ton Garford purchased in March, 1920. In addition the Garford goes daily to the stations for freight loads, once at noon and again at three in the afternoon. The noon freight load is rather light, containing only about 40 packages; the afternoon load averages about 100 packages. The delivery loads also average 100 packages.

Every week the 1¼-ton truck makes a delivery to country customers and another one to Coney Island, Bath Beach, Sheepshead Bay. Long Island, and the Bronx. On Saturday it makes an extra city trip to deliver the extra heavy purchases. This makes a total of 19 trips a week, or 988 a year.

On its delivery trips the truck averages 33 stops. On the freight trips, of course, there is only the one stop at the freight-station. Our material is bulky but not very heavy, and the average load is only 1,000 pounds.

Some department stores have a policy of collecting all the packages purchased by a customer in different departments, and delivering them together. In our stores, as soon as a customer makes a purchase the package is rushed to the shipping platform and sent on the first truck available. This may seem like an inefficient method of handling deliveries, but we find our customers appreciate our rapid delivery.

In its first year's operation the 1¼-tonner has cost us only $4.85 for actual repairs. In addition our driver washes and packs the tires every week, and spends three days a year tightening up the truck, for which we allow $18.00. We are also allowing $100.00 a year for repairs and maintenance. The truck regularly carries a helper to speed up deliveries.

The Garford costs $11.64 a day, 38.81 cents per mile, 4.45 cents per packing, 0.96 cent per package-mile. It averages 12 miles per gallon of gasolene, and 120 miles per gallon of oil. This is a remarkably low gasolene consumption, but we have proved it by repeated tests.

These very satisfactory costs could not be equaled by horses. We formerly operated 22 horses but have finally displaced all with trucks, both on account of the greater speed possible, and because our customers prefer them. The increased range and speed possible with trucks brings us business which we would not secure without them.

As an example, one of our best customers bought a good order of furniture which he wanted shipped in a hurry to The Hamptons, a place 92 miles distant. Of course this would have been impossible with horses, and freight would have been too slow. The truck, however, made the trip quickly and without difficulty, eventually bringing us more business from a well-pleased customer.

One reason for our low repair costs is the fact that we have an excellent driver. Indeed, we believe no employer can expect complete success with trucks unless he trains his drivers carefully. We are very careful to hire only the highest class of men, and to give them thorough training before putting them out on a truck. Even then we trail them for a few days to make sure that they are operating the trucks properly. If we find a driver speeding at more than 20 miles an hour, we warn him; then discharge him on the second offense. We always treat our drivers very fairly, however, and usually get them to make it a matter of pride to keep their trucks in good shape. Naturally this reduces repair costs.

Years ago, when we started using trucks, we usually overloaded them, but we soon learned better, and now rarely place more than its rated loan on a truck. This is particularly important with us on account of the bad roads found in Brooklyn and New York.

Operation.	
Days operated	306
Miles traveled	9,180
Miles per day	30
Miles per gallon of gasolene	12
Miles per gallon of oil	120
Average Cost.	
Cost per day (including driver and helper)	$ 11.6439
Cost per mile	.3881
Total cost for period	3,563.06
Itemized Cost.	
Driver and helper cost per day (included above)	$ 7.48
Depreciation per mile	.0490
Maintenance and repairs:	
Actual, total	22.58
Actual, per mile	.0025
Estimated, per mile	.0129
Tire cost, estimated per mile	.0073

Decade's Change in Roads

In the last ten years there has been a great change in the type of road suitable for traffic conditions on main traveled highways, according to engineers of the Bureau of Public Roads. In 1910 plain and surface-treated macadam were considered among the highest types of paving for country roads and a large percentage of the mileage was of the two types. There was a small mileage of brick and concrete and a somewhat greater mileage of bituminous macadam, but the plain and surface-treated macadam were the predominant types of hard-surface roads. How great the change has been is shown by figures recently issued by the bureau. On federal-aid roads completed between 1916 and 1920 only 2.9 per cent. of the total area paved was plain and surface-treated macadam. The types that formerly constituted such a small part of the mileage were as follows: Bituminous macadam, 3.1 per cent.; bituminous concrete, 6.3 per cent.; cement concrete, 19.3 per cent.; and brick, 4.1 per cent.

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Coming Events

Oct. 2 to 7, 1922.—New York City. First annual National Fire Prevention Exposition, 22d Regiment Armory. Exhibit of fire-fighting apparatus. A. E. MacKinnon, manager, 405 Lexington Avenue, New York.

Oct. 3 to 7, 1922.—Brockton, Mass. Automotive exhibit at 49th annual Brockton Fair, sanctioned by Boston Automobile Dealers' Assn. Trucks, cars, tractors and accessories.

Oct. 4 to 15, 1922.—Paris, France. Annual automobile show, Grand Palais.

Oct. 7 to 14, 1922.—New York City. Electrical exhibit. Grand Central Palace. Electrical vehicles. Norman Maul, 130 E. 15th St., New York.

Oct. 9 to 16, 1922.—Little Rock, Ark. Sixth annual automobile show, auspices Little Rock Automobile Dealers' Assn. State Fair Grounds. Trucks, cars and accessories. A W. Parke, manager, P. O. Box 699, Little Rock.

Oct. 10, 1922.—Clarksburg, W. Va. Convention of West Virginia Automobile Dealers' Assn. George M. Ford, secretary, 1407 Market St., Wheeling, W. Va.

Oct. 10, 1922.—Hartford, Conn. Convention of State Automotive Dealers' Assn. of Connecticut. Hotel Bond. Arthur Fifoot, secretary.

Oct. 12 to 23, 1922.—London, England. International Commercial Vehicle Exhibition. Olympia.

Oct. 16 to 20, 1922.—Atlantic City, N. J. Accessory show and convention of Automobile Accessories Branch of the National Hardware Assn. of the U. S. Ambassador. T. James Fernley, secretary, 505 Arch St., Philadelphia, Pa.

Oct. 16 to 21, 1922.—Jackson, Miss. Automobile exhibit by local dealers. Mississippi State Fair. Trucks, cars and accessories. Mabel L. Stire, secretary.

Oct. 17 to 20, 1922.—Pomona, Cal. Automobile and accessory show of the Citrus Belt Auto Trade Assn. Los Angeles County Fair Grounds.

Oct. 18 to 20, 1922.—Chicago. Convention of National Assn. of Farm Equipment Mfrs.

Oct. 26 and 27, 1922.—Detroit. Automotive production meeting of the Society of Automotive Engineers.

Oct. 26 to 28, 1922.—Washington, D. C. Second annual conference for study of highway engineering and highway transport education, auspices Highway Education Board.

Nov. 9 and 10, 1922.—Des Moines, Ia. Convention of Iowa Automotive Merchants' Assn. A. J. Knapp, secretary, Shops Bldg., Des Moines.

Nov. 10 to Dec. 19, 1922.—Brussels, Belgium. Automobile show, Palais de la Cinquantenaire.

Nov. 13 to 18, 1922.—Chicago. Annual exhibit and convention of Automotive Equipment Assn. Coliseum.

Nov. 21 to 23, 1922.—Grand Rapids, Mich. Annual meet of Michigan State Good Roads Assn.

Nov. 22 to 29, 1922.—Cincinnati. Second annual automobile, accessory and radio show, auspices Cincinnati Automotive Trades Assn., Music Hall. Trucks, cars, tractors, accessories and radio equipment. John J. Behle, manager, 809 Gerke Bldg., Cincinnati.

Dec. 6 to 8, 1922.—Toledo, O. Sixth annual convention Ohio Automotive Trades Assn. LaSalle-Koch assembly rooms. E. J. Shover, manager, 404 Central National Bank Bldg., Toledo.

Jan. 6 to 12, 1923.—New York City. Annual automobile show of National Automobile Chamber of Commerce. Grand Central Palace. Cars and accessories. S. A. Miles, manager, 46th St. and Madison Av., New York.

Jan. 8 to 13, 1923.—New York City. Second annual body-builders' show, auspices of Automobile Body-Builders' Assn. 12th Regiment Armory.

Jan. 13 to 22, 1923.—Oakland, Calif. Fifth annual show of Motor Car Dealers' Division of Alameda County Auto Trade Assn. Civic Auditorium. Trucks, cars, tractors and accessories. Robert W. Martland, manager, 407 Pacific Bldg., Oakland.

Jan. 13 to 24, 1923.—Brussels, Belgium. Sixteenth annual Automobile and Cycle Exposition. Palais de la Cinquantenaire.

Jan. 15, 1923.—Topeka, Kans. Convention of automobile Trades Assn. of Kansas. Philip E. Zimmerman, Topeka.

Jan. 27 to Feb. 3, 1923.—Chicago. Annual automobile show of National Automobile Chamber of Commerce. Coliseum and First Regiment Armory. Cars and accessories. S. A. Miles, manager, 46th St. and Madison Av., New York City.

Feb., 1923.—Charlotte, N. C. Annual automobile show of Charlotte Automotive Trade Assn. Carolinas Exposition Bldg.

Feb., 1923.—Salt Lake City. Annual meeting of Intermountain Automotive Trades Assn. Carl L. Snow, manager, Salt Lake City.

Feb. 3 to 10, 1923.—Minneapolis. Sixteenth annual automobile show, auspices of Minneapolis Automobile Trade Assn. Trucks, cars, tractors and accessories. W. R. Wilmot, manager, 709 Andrus Bldg., Minneapolis.

Feb. 12 to 19, 1923.—Portland, Ore. Fourteenth annual show of Automobile Dealers' Assn. of Portland. Municipal Auditorium. Trucks, cars, tractors and accessories. Ralph J. Staehli, 424 Henry Bldg., Portland.

Feb. 17 to 24, 1923.—St. Louis, Mo. Sixteenth annual show, auspices of St. Louis Automobile Dealers Assn. Trucks, cars and accessories. Robert E. Lee, manager, 1324 Locust St., St. Louis.

Feb. 17 to 24, 1923.—Akron, O. Ninth annual show of Akron Automobile Exhibition Co. Central Garage. Trucks, cars, tractors and accessories. E. T. Jones, manager, 1091 W. Exchange Av., Akron.

Feb. 28 to Mar. 3, 1923.—Syracuse, N. Y. Fifteenth annual show. State Armory. Trucks, cars and accessories. Howard H. Smith, manager, 701 Eckel Bldg., Syracuse.

Mar. 3, 1923.—Quincy, Ill. Fourth annual convention of Illinois Automotive Trade Assn. F. C. Zilman, manager, 212 Lehlmann Bldg., Peoria, Ill.

Mar. 10 to 17, 1923.—Boston. Annual show, auspices Boston Automobile Dealers' Assn. Merchants' Bldg. Trucks, cars and accessories. Chester I. Campbell, manager.

During the present construction season the Pennsylvania State Highway Department has put down 224.6 miles of durable highway. This mileage is less than that constructed during the same period in 1921, due to the fact that not so many contracts are in force and also to the effect of the coal and railroad strikes.

New Atlas Speed Trucks

The Industrial Motors Corporation merged the Atlas Truck Corporation, York, Pennsylvania, and the Selden Truck Corporation, Rochester, New York. The Atlas speed trucks manufactured by the former are now distributed by the Selden Truck Corporation.

The Atlas line consists of two speed truck models, the "Merchants' Despatch" model 22, rated at 1 ton, and model 44, which has a rating of 1½-ton. Both models are equipped with the Buda "M" motor, 3¾ inches by 5⅛ inches, worm-drive rear axle and transmission of Atlas manufacture.

The complete specifications of these two new models follow:

	Model 22.	Model 24.
Rated capacity	1-ton	1½-ton
Engine:	Buda, M	Buda, M
Location	Under hood	Under hood
Cylinders	4	4
Bore and stroke	3¾x5⅛	3¾x5⅛
Rated horse-power	22.5	22.5
Brake horse-power	35	35
Normal speed	1,500 R. P. M.	1,500 R. P. M.
Cylinders cast	En block	En block
Cylinder head	Removable	Removable
Valves placed at	Right	Right
Carbureter	Zenith 1-inch	Zenith 1-inch
Ignition	Atwater-Kent	Splitdorf magneto
Lubrication	Forced-feed	Forced-feed
Starter	Bijur	Atwater-Kent
Generator	Bijur	Atwater-Kent
Battery	Prestolite 120-amp.	Prestolite 120-amp.
Clutch	Borg & Beck	M & E
Motor suspension	3 points	3 points
Motor weight	650 pounds	650 pounds
Valve diameter	1½ inch	1½ inch
Crankshaft	2⅛ inch	2⅛ inch
Bearings:		
Front	1¾x2½	1¾x2½
Center	2 x2½	2 x2½
Rear	2⅛x3	2⅛x3
Connecting-rod	1⅞x2	1⅞x2
Wrist-pin	1 1/16 x 1⅞	1 1/16 x 1⅞
Transmissions—	Atlas	Atlas
Type	Selective	Selective
Location	With engine	With engine
Forward speeds	3	3
Gears	3½% nickel	3½% nickel
Main bearings	Double-row ball	Double-row ball
Gear face	13/16-inch	13/16-inch
Reduction on "low"	2.8 to 1	2.8 to 1
Reduction on "second"	1.77 to 1	1.77 to 1
Reduction on "high"	1.0 to 1	1.0 to 1
Reduction on "reverse"	3.6 to 1	3.6 to 1
Universal joints	2, steel	4, steel
Final drive—	Atlas worm	Atlas worm
Total reduction on "low"	(a) 14.46 or (b) 16.8 to 1	(b) 16.8 or (c) 19.6 to 1
Total reduction on "second"	(a) 9.75 or (b) 10.62 to 1	(b) 10.62 or (c) 12.59 to 1
Total reduction on "high"	(a) 5 1/6 or (b) 6.0 to 1	(b) 6.0 or (c) 7.0 to 1
Total reduction on "reverse"	(a) 18.59 or (b) 21.6 to 1	(b) 21.6 or (c) 25.2 to 1
Torque taken by	Springs	Springs
Propulsion taken by	Springs	Springs
Frame—		
Length back of seat	8 feet	11 feet
Body base above ground, laden	28 inches	29 inches
Body base above ground, unladen	31 inches	33 inches
Springs, ½-elliptical	36x2 front	36x2¼ front
	46x2 rear	52x2½ rear
Wheel-base	130-inch	146-inch
Wheels	Wood	Wood
Tires—Pneumatic cord	34x4½ front	36x6 front
	34x4½ rear	36x6 rear
(Under no circumstances will solid tires be furnished.)		
Steering-gear—	Worm-and-gear	Worm-and-gear
Location	Left	Left
Throttle control	Hand and foot	Hand and foot
Service brake	Rear wheels	Propeller shaft
Emergency brake	Transmission	Rear wheels
Chassis weight	2,850 pounds	3,600 pounds
Fuel-tank capacity	10 gallons	10 gallons
Turning radius	18 feet	24 feet
Body weight allowance	750 pounds	900 pounds
Equipment—	2 Head-lights	2 Head-lights
	1 Tail lamp	1 Tail lamp
	1 Set tools	1 Set tools
	1 Jack	1 Jack
	1 Electric horn	1 Electric horn
	1 Tire-carrier	1 Tire-carrier
	1 Alemite gun	1 Alemite gun

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Motor and Tram: "Friendly Enemies"

By PRESTON S. ARKWRIGHT
President, Georgia Railway & Power Company, Atlanta, Georgia

WHEN I first came with the street-railway company, about twenty years ago, it didn't own a single automobile and it wasn't buying any for other people either. It at that time was running street-cars exclusively, and it had just exactly 106 of them. The number of motor vehicles it owns now is the identical number of street-cars it ran then.

These vehicles of ours ran 1,134,087 miles in 1921. Without counting interest, taxes, or renewals, the cost to us to operate them was $118,354.24. Our tire bill was about $21,000, and we used up $30,000 worth of gasolene.

Not only are we now the largest customer of the motor truck in the town, but we are the largest prospective customer. Our business in its various branches grows more hapidly than the population, and is covering constantly a wider and wider area. We buy the truck not for fun or pleasure, but because of its economy and efficiency in the transaction of our business, and as our business grows we will be buying more and more of them. One branch of our business is the transportation business. There are legitimate uses for the motor vehicle in the transportation business, and as this business develops, the time will come when we will be using them as public transportation vehicles in territory where the business would not justify the building of the rail lines. So, we benefit from the motor vehicle in the transaction of our own business; also we benefit from the motor vehicle in the stimulation it gives to the growth of the community which we serve.

We are not enemies of the motor truck. We appreciate its usefulness and value in business and we prove this by making a greater use of it than anyone else. We likewise realize its advantages to others. We know that it adds immeasurably to the pleasure and the happiness and the enjoyment of people and facilitates the transaction of their business and their social intercourse. No one can gainsay the convenience, the comfort, the pleasure, and the enjoyment that it gives.

Even if it were possible for everybody to own and operate an automobile and they all attempted to do so, the streets of the city would become so congested that the use of the streets would have to be forbidden to all automobiles or private vehicles of any kind.

The street-railway company in Atlanta handles, on the average at present, approximately 250,000 passengers a day. If only even every family owned its automobile and these passengers were attempted to be transported at the rate of five passengers to an automobile it would take 50,000 automobiles to transport this number of people. These automobiles, spaced 50 feet apart, would stretch out a distance of 473 miles and would consume 55 hours passing a given point.

Going down to work in them, a person would have to start about 2⅛ days before 8 o'clock in the morning and travel all day and all night, and then would have to turn back when he had gone only about one-twelfth of the distance in order to get home in time for supper.

All this is upon the idea that the automobiles are constantly traveling at a rate of 12 miles per hour, but of course they couldn't travel at this rate in the jam of traffic that would be produced, nor could they travel all the time. They have to be parked somewhere and if they were parked on the streets they would fill every paved street in the town and leave no room for anybody to travel back and forth.

In the interest therefore, of the public who can't own automobiles and also in the interest of those who do own automobiles, and as a necessity for the existence of cities, it is essential to have a public transportation service. On this public transportation the great body of the people rely. Mass transportation is incapable of being furnished by automobiles as public carriers. This form of transportation demands rail transportation. It requires large units. Great numbers of the people move in a few hours of morning and afternoon, and to transport them requires large vehicles—larger than is practicable with automobiles—and heavier than can be run on paved streets. The fare for this public transportation must be low and consequently the means of providing public transportation must be economical.

In congested centers where traffic is dense the most economical transportation at present is the electric railway. Its operating costs per passenger are smaller than the operating cost per passenger of automobiles or 'buses, and while the investment is greater proportionately in the electric railway with its self-owned roadbed than the automobile with its publicly provided roadbed, the great number of passengers transported reduces the fixed charges per unit, so that, even with these larger aggregate fixed charges, the cost of transportation per passenger under circumstances like these is smaller than the corresponding cost if this transportation were attempted by the automobile or the motor 'bus.

We know how frequently the 'buses run on Fifth Avenue in New York, and yet one subway train carries more passengers than these 'buses can carry in 30 minutes.

Even if automobiles were economically possible for this form of transportation the capacity of the streets would be insufficient to accommodate the myriads of small units necessary to serve the many thousands of passengers who demand service collectively in short periods of time. Whatever the future may hold, certainly at the present there is no method for this form of transportation that is as cheap or as practical as electric railway operation.

The automobile, legitimately and properly used, has unquestionably deprived the electric railway of a large revenue which it would otherwise have received. For instance, there are approximately 15,000 passenger automobiles owned and operated in the city of Atlanta at the present time. Assuming that each one of these automobiles deprives the electric railway of only two passengers a day, this would mean $2,100 in revenue which the street-railway would have received except for the automobiles. This amounts to $766,500 in a year and accounts for more than one cent per passenger of the street-railway fare; that is to say, if this revenue were not taken away from the street-railway, the street-railway fares would be at least one cent lower than they are otherwise compelled to be. Yet neither I nor anyone else can properly complain of this, nor do we. This is perfectly proper and perfectly legitimate and the facility and the convenience and comfort which these automobiles bring and the advantage that they are to the community certainly more than make up for the necessary loss which their operation brings to the street-railway and its passengers.

In spite of the great number of automobiles and the large number of people using them to the exclusion of the street-cars, the street-railway business itself in Atlanta has continually grown. For instance, the revenue passengers carried in 1903 by the street-railroads before the advent of the automobile were 20½ million and in 1921 were 73½ million. The number of revenue passengers carried by the street-railroad has increased each year over the preceding year, with the exception only of periods like 1914, 1915, and 1921, when there was a general business depression curtailing activities and affecting the business of the street-railway as it affected all other businesses.

Not only has the number of passengers increased each successive year, but the number of rides on the street-railway per capita has likewise increased each successive year. For instance, the rides per capita in 1903 were 150 and in 1921 they were 292. While there has been a steady increase from year to year in the rides per capita there have been decreases also, but these decreases occurred in the years of financial and business depression above referred to, and were not brought about by the automobile. So that, while the automobile has taken passengers away from the street-railway and reduced its traffic below what it otherwise would be, it has by no means supplanted the electric railway nor made it less useful; on the contrary, the record proves that the street-railway has grown continuously more useful, notwithstanding the automobile.

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The loss of passengers is not the only loss and not the only handicap imposed on the street railway by the automobile. In the old days when the street railway was the horse car, the strip between the rails became a treadmill and the constant beating of the hoofs all day long, day after day, wore away the pavement. So municipalities required the street-railway companies to pave, repave, and keep in repair the pavements they wore out. With the passing of the horse the reason for this requirement passed, too, but not the requirement. No governmental demand once fastened on the street-railways has ever been relaxed. So street-railways are still required to pay for the pavement, repavement and maintenance of a strip varying from 11 to 16 feet in width for the exclusive benefit of the other vehicles. Automobiles require smoother pavement, heavier pavement, more expensive pavement, and lengthier pavement, and their constant use of it makes necessary more frequent renewals and repairs of pavement. Parking of cars on the sides of the street throws all the traffic into the center of the street and accelerates its wearing out. The street-railway in Atlanta has paid for paving in the last 20 years $1,400,000. For paving and track readjustments made necessary by paving this company paid in 1920, $238,120.62; in 1921, $205,194.38, and for 1922 the projects already authorized will soak it for about $500,000.

Every dollar of this expenditure has to be met out of the street-railway fares and affects the amount the passenger must pay for his ride, and the quantity and quality of service it is possible to render him. The street-railway rider is generally unable to own an automobile. He comes from the less wealthy class of the community, he makes no use of the pavement—and yet he is compelled to pay for it.

Not only has the automobile increased the direct burden of paving expense on the street-railway rider, but its insistent call for more and better paving has increased the tax charge on this street-railway rider to help pay for the paving outside the railway track area, and on streets and roads where there are no tracks at all.

The total taxes paid by this company for the year 1921 amounted to $916,764.84, of which $282,797.85 was paid to the city of Atlanta in addition to paving, making total of taxes and paving paid by this company to the city $384,340.50. Every dollar of this had to come out of the fares and in the end was paid by the customers of the service. All the automobiles and trucks in the city of Atlanta paid an aggregate of $36,504.37 in taxes to the city, averaging about $2 apiece.

Automobiles have vastly increased the traffic congestion. In fact, but for them there would be no traffic problem. Now the hamlet without its traffic police is insignificant indeed. The parked cars force all the moving vehicles on to the track area, retarding the street-cars, disarranging the schedules, slowing up the movement, and making more street-cars necessary to handle the same number of passengers.

While through the years the gross receipts of the street-railway have increased and the rides per capita have increased, the expenses of providing the service have increased in a much greater ratio. The taxes, the paving charges, the damage suits, have multiplied. Labor is the largest proportionate part of the operating expense of furnishing electric railway transportation. Ignoring the cost of power, the expense of conducting transportation consists of 96½ per cent. labor and 3½ per cent. material.

Decreases in the prices of materials have an almost negligible effect on the operating cost of furnishing electric railway service with this company. While the fares have been increased from 5 to 7 cents, the street-railway system in Atlanta failed to earn its operating cost including the Commission's rate of return on the Commission's minimum valuation in the year 1921 by the sum of $350,000. For the first two months of the year 1922 the street-railway department of this company failed to earn the cost of furnishing the service, including the Commission's rate of return on the Commission's minimum valuation of the property by the sum of $140,000.

In the interest of the community, in the interest of motor dealers as citizens of the community, and in their business interest as vehicle dealers it is necessary that the street-railway service should be extensive, should be adequate, should be rendered at a low rate of fare.

There are certain losses which are unavoidable. There are certain handicaps to the service which are unescapable, but every unnecessary burden and every avoidable handicap ought to be removed in the interests of the street-railway rider, the street-railway service, and the community served by the street-railway company.

We have advocated that automobiles be not used for the exclusive purpose of riding from home to office, parking in the streets all day and riding back from office to home when this service could be provided by the street-railway company. We have called this an extravagant use of the automobile. If a person needs to travel around and about the town we take no exception to his using his automobile to ride from his home to his place of business and to make his numerous business calls during the day. If a person wants to take a pleasure ride or a long ride we urge no objection for using the automobile for this purpose. But we do say that using the automobile for the exclusive purpose of riding from home to office, parking in the middle of the streets all day and riding back from the office to home is unnecessary use of the automobile—an extravagant use of the automobile. In urging this we are acting not only in the interest of the street-railway service but we are acting as well in the real interest of the great body of automobile users. If everybody owning an automobile drives it into the center of town, parks it on the streets, the time will come when parking of automobiles on the streets will be forbidden altogether. Streets are to travel on. The right to stop on them is only incidental to the right to travel along them. Parking cars on the streets indiscriminately restricts the portion of the street for travel, impedes the movement of the street-cars, impedes likewise the movement of automobiles, slows up the traffic generally, is contrary to the interest of the general public, including the automobile user, and if carried to an extreme will inevitably end in forbidding the parking of automobiles on the streets altogether.

As one comes driving down the street one sees little groups of people standing at the intersections now and then under little signs, saying "Cars stop here." They are gathered there by accident. The street-railway company has made a large investment in the tracks and trolleys in the street and in a lot of other property, too, and has bought cars and hires men and pays out a heap of money in operating expenses and fixed charges to get those people to gather in these little groups. They are waiting to get on the street-car which is running up and down that street at frequent intervals, sometimes full and sometimes empty, all day and most of the night, every day in all sorts of weather, in order that those people may ride on it. They pay to ride on it and the money which they pay is the only money the street-railway gets out of which to meet the costs of keeping those cars running and to pay the taxes, interest and fixed charges on the facilities it has provided so as to furnish the convenience of a dependable public transportation system.

The passenger at last depends upon the street-car. He comes out on the street to wait for the street-car to come along. Somebody drives along in an automobile and picks him up. I've seen them pick them up while they are in the act of stepping on the street-car. I saw an instance where an automobile picked up five passengers who were waiting for the street-car, and the car had already slowed down preparatory to taking on the passengers, opened the door and one passenger had his foot on the step. It often happens that the person driving the automobile will even stop it on the street-car tracks to pick up the passengers, thus not only depriving the street-cars of the passengers but making it necessary for the street-car to stop until the automobile takes its passengers away from it.

The expense of operating the street-car is the same, whether these people ride on it or not, so that the revenue thus lost by the street-railway not only comes out of the gross receipts, but out of its net receipts as well. To this extent it restricts the ability of the street-railway company to furnish the quantity and quality of street-railway service desired, and it affects the fare that must be charged by the street-railway for the passengers who ride.

It's an unfair form of business competition.

Now this practice is not only unfair to the street-railway company but it is injurious to the community. It may seem like a little thing, and so it would be if it was only occasional. But in reality it's quite general and in the aggregate amounts to more than one imagines. For instance, on our suburban lines we bring into town in the morning 10 per cent. fewer passengers than we carry out in the afternoon. This is due exclusively to the picking up of waiting passengers by automobiles. We think this is an unnecessary injury to the street-railway service and is what we call an abuse of the automobile.

Then there's the degradation of the automobile—the "jitney." If the "jitneys" were subjected to the same obligations of the street-railway company we would have no just ground of complaint. We pay large

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sums of taxes on our physical property, as already stated. We pay large sums for street-paving which we don't use, but which they use. We pay the city of Atlanta $152,000 in addition as a license tax for the privilege of using the streets. We operate subject to public control. We run cars from early in the morning until late at night and sometimes all night long. We run them every day in weather bad as well as good. We stick to established routes; we haven't the power to change the route. We cover not only the near-in districts but the distant suburbs. We are required to run cars for the convenience of people. often we run more cars than there are people who want to ride. We are also required to be responsible. Our property is fixed and valuable. We respond to damage claims.

The "jitney" operator pays practically no property tax, contributes nothing to the cost of pavement, is subject to no regulations, runs when he pleases, stops when he likes, goes only so far as he chooses, has no obligations whatever. He is generally irresponsible, owns nothing but the car, if even he owns that, and is utterly unable to respond in damages. It's an unfair, illegitimate form of competition because it's carried on under different rules and with freedom from the burdens and the obligations of the street railway service. It means nothing to the town. It adds no dollar to the value of the property. It is utterly unreliable. Its effect is to deprive the street-railway service of its legitimate revenue and to that extent restrict the street-railway's ability to furnish the character and quality of service the public desires, and affects the rate of fare which must be charged for such service.

Way back in 1914 this company originated the slogan, "The safest place on Atlanta's streets is in Atlanta's street-cars." Recently we have been using this slogan a good deal in our publications, advertising the only thing we have for sale, viz., street-car rides. Now we admit the private automobile has it over the street-car in speed, luxuriousness, exclusiveness and flexibility. The automobile trade advertises the advantage of the automobile in promoting its sale. There can't be any objection to our advertising the virtues of the street-car in an effort to induce the buying of rides. One of these virtues of the street-car over any other form of transportation, even walking on city streets, is safety. We know it's true in Atlanta, and according to a report recently published by the National Safety Council it's true in all cities, everywhere.

But surely the street-car and the automobile are not enemies. While each of us may do the other a little injury the benefit that we accomplish more than counterbalances the harm. There are many things in which we are mutually interested, such as the growth of the community, so there'll be more people to ride on street-cars and more to buy automobiles; the proper regulation of traffic so that both street-cars and automobiles may move along without vexations, delays and without accidents; the facilities for the transaction of our business which each provides the other. We are too greatly interested together knowingly to injure the other unnecessarily.

Truck Saves $3,000 Yearly on Short Depot Hauls

By A. N. PHILLIPS

President, Central Ohio Supply Company, Columbus, Ohio

IN NEARLY two years' operation our 2½-ton Selden hasn't lost a single day for repairs, the only attention required being for minor troubles. This truck hauls our incoming freight from seven depots, and by its speedy and dependable service enables us to get our goods to customers as promised. This naturally has resulted in better satisfied customers and increased business.

We are dealers in bakers', confectioners' and ice cream manufacturers' supplies, and are the only concern of our kind in Columbus. We buy our goods in quantities, haul them from the freight stations to our warehouse, and then resell them usually in smaller quantities. Our warehouse occupies practically an entire building, having a floor area of over 22,000 square feet.

The freight depots which the truck reaches are from 2 blocks to 1½ miles away, and we aim to make each depot at least once a day. The loads usually consist of crates, boxes or barrels. Sometimes the truck is loaded both ways, when we are making a freight shipment out of town. It makes about 3 trips a day and carries 4 or 5 loads, averaging 2½ to 3¼ tons. We don't believe in overloading.

The truck operates for $10 a day with driver. It does the work of two teams, which would cost us at least $20 a day, so it saves over $3,000 a year on our freight hauling. It has stood up well in spite of bad road conditions, as shown by its repair bill of only $100 for two years' hard service.

The truck has a good driver, who is very careful and catches small troubles before they become serious. He uses lots of oil and grease, and we believe it pays. We figure that the truck is good for 8 years. This means only about 28,000 miles because it spends most of its time loading and unloading, and makes only short hauls.

In spite of the unfavorable conditions encountered around the freight-houses, where the roads are unusually rough and deep ruts are the regular thing, repairs have been very low. Outside the few hours required for adjustment, the truck has operated continuously.

Our regular city delivery work is handled by a 2-ton truck. When purchasing the Selden we chose a heavier truck as better adapted for freight work. Occasionally the latter makes deliveries to help out the other truck, and it has proved satisfactory on this type of work also.

Because of our short hauls, it might appear that we should find horses more economical than trucks, but this is not the case. We abandoned horses for our delivery work 5 years ago, because they haven't the necessary radius. For our freight work they were unsatisfactory because they were not as fast as trucks and cost more.

The speedy and prompt service given by trucks means quicker deliveries, better satisfied customers, a quicker turnover, and increased business. It would require at least two teams to handle the work of the 2½-tonner, because they are slower and carry only one or two tons. We have loaded 8 tons on a team, but this is exceptional.

OPERATING RECORDS.

Total Period.

Period covered	20 months
Days operated	510
Total round trips	1,530
Deliveries—pickups	6,120
Loads out—tons	5,738
Total loads—tons	5,738
Miles traveled	5,809
Gasolene used, gallons	1,417
Cylinder oil used, gallons	64

Daily Averages.

Round trips	3
Deliveries—pickups	12
Loads out—tons	11.25
Total loads—tons	11.25
Miles traveled	11.39
Miles per round trip	3.79
Load per trip—tons	3.75
Ton-miles	21.3
Miles per gallon gasolene	4.1
Miles per gallon oil	90.8

COST RECORDS.

Investments.

Chassis—etc., complete	$4,350.00
Tire value (pneumatics front)	348.50
Total, less tires, to be depreciated.	$4,001.50

Fixed Charges—Yearly.

Interest on total investment (8 years) at 7%	$ 171.28
Taxes and licenses	25.00
Insurance	125.00
Garage expenses	120.00
Total per annum	$ 441.28
Total per month (per day $1.44)	36.77
Total for period—1 year 8 months	735.47

Variable Charges—Period.

Fuel at 23 cents gallon	$ 325.91
Cylinder oil at 80 cents gallon	51.20
Tires—5,809 miles ($348.50 ÷ 9,000-mile life)	224.81
Depreciation—5,809 miles ($4,001.50 ÷ 28,000-mile life)	830.11
Maintenance and repairs (estimated)	333.33
Total variable charges (per day $3.46)	$1,765.36
Driver's wages (per day $5.10)	2,601.00
Total fixed charges	735.47
Total operating costs	$5,101.83

Unit Costs.

Cost per day operated	$10.00
Cost per mile traveled	.878
Cost per ton hauled	.889
Cost per ton-mile	.468
Repair cost per mile—estimated	.057
Repair cost per mile—actual	.017

Farm Trucks Cheaper

The average truck used in the transportation of farm products to market covers twice the mileage during the day in less time than two teams of horses cover, according to an actual test made by the research department of the Republic Truck Sales Corporation. Costs figured during the tests show that over a year's period, the cost of operating two teams of horse-drawn vehicles was $1.21 per ton-mile, while the operation of the one truck that performed twice the service was only 30 cents per ton-mile. The yearly fixed charges and operating costs, taken from the books of the company, show that the truck's yearly cost was $2,967.62 and that of the two teams of horses, $4,410.82.

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Railways Must "Fight Fire with Fire" in Competition

SHOULD ADOPT RAIL MOTOR CARS SOON

The railroad's point of view in the matter of motor competition is expressed as follows by the *Railway Review:*

"Light local passenger service is undoubtedly the most expensive luxury in proportion to the returns that the railways can offer the public. Whether it be the daily branch life 'turn-around' or the main line 'short-dog' that must be maintained at the mandate of a state commission, it results usually in a very meager return, while the expense of operation is often considerable.

"This is particularly true where a steam locomotive is used to haul a couple of passenger-coaches. Under these circumstances it is seldom that the fuel consumption is less than 400 pounds of coal per car-mile, while a full passenger and engine crew must be employed. Locomotives retained in this class of service are invariably old and decrepit so that the cost of their maintenance usually runs high. Branch lines are seldom built for their passenger traffic possibilities, but once constructed, passenger service is demanded and must be constantly operated even after the original freight prospects may have become exhausted, so that these branch lines frequently transpire into white elephants on the hands of the owning railroads.

"Some years ago large gasolene-driven cars entered the market and, subsequently, gasolene-and-electric cars were substituted for light passenger trains on many railways. Admirable and elegant in construction as these cars proved to be, their first cost in many instances approached that of a new locomotive and the intricacies of their mechanism often demanded a large share of official attention from the chief electrical engineer down.

"Faced with these diccouraging circumstances in the operation of light passenger service, it has been particularly galling to railway management to observe the motor truck and 'bus thriving on the very traffic that had caused the railways an actual loss. This situation has naturally been aggravated in the minds of railway managers by the fact that the automobile is being run over a road built and maintained by the taxpayers which, of course, includes the railways in large measure. It is as futile, however, to argue against the inroads which the automobile has made upon rail traffic or to suggest the prohibition of this automobile traffic as to remonstrate against the rapid spread of a forest fire.

"The most effective policy is to fight fire with fire. A very plausible remedy is suggested in the form of a rail motor 'bus. Following closely in detail the main features that are responsible for the successful performance of the motor truck, it may be assumed a rail 'bus can be constructed which embodies the same elements of simplicity in construction, reliability in performance, flexibility in operation, light weight and low first cost. It is possible that if the rail motor 'bus is to be successfully operated as a substitute for the light passenger train in main-line service as well as on branch lines, that a maximum speed of more than 30 miles per hour should be attainable, but it is believed that, if designed to meet various local conditions, the field for a light gasolene rail-car patterned after the automobile affords many interesting possibilities in the direction of economy and better service."

Courtesy Campaign Growing

Greater civility on the part of the one million motor truck drivers in this country is anticipated from now on by reason of the excellent response that has been made to the educational campaign being carried on by the National Motor Truck Committee of the National Automobile Chamber of Commerce. The pamphlet that is being used in the campaign, "Common Sense on the Highway," has already reached a circulation of 125,000 copies among truck manufacturers, dealers and fleet operators. Requests for additional copies are being received daily from some of the largest truck users, who comment in highly favorable terms and show a keen desire to stimulate interest among drivers. The pamphlet is illustrated by cartoonist Claire Briggs who shows in his inimitable style that courtesy is as cheap as the air and why drivers should move to the right to accomodate faster moving vehicles.

Parts Trade Still Good

No seasonal slump has been experienced by members of the Motor & Accessory Manufacturers' Association, reports of sales for the month of July showing a decrease of only 2.42 per cent. below June. The total sales for July aggregate $41,001,670, as against $42,000,000 for June. Comparing July of this year with the same month in 1921, it is noted that this year's July business is roughly 77 per cent. better. Collections are slower, the past due column showing $3,423,850 on the books, as against $2,840,000 for June, a sharp increase of 20.42 per cent. Notes outstanding aggregate $2,217,670, a decrease of 4.49 per cent., which shows liquidation activity. Sales for the first seven months of 1922 reach a total of $228,501,670, as compared with $136,096,214 for the same period of 1921.

The following table shows the sales by members of the association, the total of past due accounts, and the total of notes held for all the months of 1921 and the first seven months of 1922:

1921.	Sales.	Per Cent. Change.	Past Due.	Per Cent. Change.	Notes Outstanding	Per Cent. Change.
January	$6,264,587	.....	$8,099,727	.....	$4,359,871	.....
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,069,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922.						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,488,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.5 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.5 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5. Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc.	2,217,670	4.49 Dec.

Truck Operators Can Gain Through Coöperative Work

SAVE 20% ON INSURANCE IN SYRACUSE

The motor truck operators in Chemung County were urged recently to pool their interests for the sake of group insurance and other benefits by F. W. Fenn, secretary, National Motor Truck Committee, National Automobile Chamber of Commerce, who spoke before a joint meeting of the Elmira Chamber of Commerce and the Traffic Club.

"The present importance of truck transporation demands that truck operators everywhere organize to reduce their operating costs. In New Jersey this has already resulted in a saving of 20 per cent. in insurance charges alone. Chambers of commerce can be of very great help in this work. The Akron and Syracuse chambers of commerce have already actively entered the field in behalf of their truck operators.

"Few people perhaps realize that trucks are among the chief factors in putting the railroads on their feet financially. I have this on good authority from one of the country's great railroad executives. There is a great significance, therefore, to the statement issued a short time ago by President Harding in which he said there could be no doubt as to the position of the good roads movement in the solution of our distribution problem."

The speaker then went on to show how trucks have reduced the delivery cost of milk in Milwaukee and other cities, of shoes in New England, and of cotton, corn and wheat in the south and west. For all these benefits it was shown that the cost to every individual man, woman and child in this country last year was only 1 cent, after subtracting the money which the motor vehicle industry and owners paid toward the building of highways.

Referring to the present transportation crisis, Mr. Fenn expressed the opinion that adequate supplies of food for all major industrial centers could be supplied by the million trucks in this country to-day in the event of suspension of railroad service at any time. Figures were given to show that normally less than 3 per cent. of the milk coming into Cincinnati arrives by rail. This was felt by the speaker to be a typical illustration of the widespread use to which trucks are being put in the haulage of perishable food supplies.

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Sixth Road Test Develops Valuable Breakage Facts

11 OF 63 SECTIONS SURVIVE TRIAL

Completion of the day runs of the sixth increment of load to be applied on the Bates experimental road in Illinois was made on August 11. The load used in this run was 8,000 pounds on each rear wheel, this being the maximum load per wheel allowed on state roads in Illinois. Paving brick held in place in the boxes of the trucks produced the required load on the rear wheels. The load on each of the front wheels during this run was 1,930 pounds, an increase of 130 pounds over the load during the last run. The load as applied corresponded to 800 pounds per inch of nominal width of rear tire, and 386 pounds per inch of width of front tire.

Exactly 5,000 applications of this load were imposed upon the surviving sections. Six sections (Nos. 6, 7, 8, 9, 10 and 11) consisting of asphalt top on macadam bases of various thicknesses, received only 3,000 applications of the load of 8,000 pounds. At the end of this number of applications the sections were rapidly breaking up and it was thought that continued applications would destroy the sections to such an extent that visitors could not distinguish the action of the previous traffic. When traffic on these sections was suspended a turnaround was constructed on section 11 and the first eleven sections left undisturbed.

Complete failures in many of the sections involved constant heavy maintenance in order that traffic might continue. Practically half of the time during this run it was necessary to suspend traffic on account of the difficulty encountered in maintaining the broken down sections; of the 37 days which elapsed from the beginning of the run to its completion, 17 days were spent on maintenance. Over 15 cars of materials were used in maintaining sections during this run.

The poor condition of some of the sections over which the trucks had to pass to reach the section that had not broken down was responsible for considerable damage to the tires of the trucks and necessitated a complete change in these tires. Though the trucks were carrying over 150 per cent. overload no engine or mechanical trouble of serious nature was experienced. This fact is nothing short of marvelous when it is considered that some of the ruts in the sections were well over a foot deep and the roughest sort of path was present.

A survey of the sections at the end of the day run of this increment of load shows only 11 sections of the 63 undamaged by traffic. Of these 11 sections, one consists of asphalt top on concrete base, one of bituminous filled brick on concrete base, and the other nine of concrete of various thicknesses and designs. In almost every section where failure is present, the breaks took place at the cut joints, progressive breaking developing from the original failure. As the bituminous brick sections contained both the lug and lugless brick, and as it was thought inadvisable to cut more than one joint in any section, it so happened that the joints were cut in that half of the section containing the lug brick. Therefore though the greater number of failures took place in the lug brick it can not be said that the lug brick is weaker than the lugless as no cut joints were present in the latter.

Of the sections remaining intact, sections 48 and 49 are the most surprising. These sections are composed of 5-inch concrete of special design. A 6-inch pavement of the same design as section 48 failed under an earlier loading. The reason for this apparent inconsistency of behavior is being investigated. The action of these sections under the night traffic will be of special interest as less support from the subgrade will be given the edges at that time.

Though some of the lighter sections are still intact, it is not an indication that these sections show sufficient strength to carry the maximum load throughout the year. During the month of July when the day run of the legal load was applied the moisture content of the subgrade was lower than at any other time of the year. As the tensile fiber stress of a 5-inch rigid type pavement is approximately 700 pounds per square inch under a load of 8,000 pounds applied 6 inches from the corner, considering the corners as unsupported cantalivers, it is evident then that some support was given the sections at that time. If this load had been applied in the early spring when the moisture content of the subgrade was high and no practical support was afforded by the subgrade, it is probable that failure would have taken place. The night run is expected to increase the probability of the failure of these sections,

Under the load of 8,000 pounds a total of 75 breaks occurred. Of this number, 60 were present in the south side of the pavement and 15 on the north side. This again illustrates the fact that if the traffic can be held away from the edges less failures will occur. At the end of the day run of this load, the road had been subjected to a tonnage of 51,600.

Night traffic on the road is now taking place. The load of 8,000 pounds per rear wheel is being used in the night runs and the same number of applications will be completed as were imposed during the day runs with this load. It is expected that a great many more breaks will develop under the night loading than under the day runs due to the fact that less support is given the corners of the pavements at night.

Due to the great number of sections that are already destroyed it is possible that two series of trucks will be run to avoid traveling over the broken down sections. Nothing as yet has been decided in regard to running an overload on the road. It is possible, however, that the completion of the 5,000 night applications of the 8,000-pound load will conclude the traffic runs on the road for the present at least.

Plans for building a few more sections of special design to be tested during the most unfavorable conditions, which occur during the late fall and spring, are being seriously considered.

Help for Republic Assured

C. H. Poppenhusen, representing the bankers' committee, and M. N. Buckner, representing the note-holders' committee, announce that an agreement has been reached between representatives of the note-holders' committee, the bankers, and other creditors of the Republic Motor Truck Company, Inc., with bankers, under which ample working capital will be provided for carrying on the business. Details of the plan providing for a readjustment of the company's capitalization and indebtedness are now being worked out and will be announced shortly.

Pulcher Deplores Use of "Pirate" Parts in Repairs

FALSE ECONOMY BUYING CHEAP PARTS

"Much of the dissatisfaction that arises when motor trucks are repaired," according to M. L. Pulcher, president of the Federal Motor Truck Company, "is directly traceable to the use of parts not made by the manufacturer of the vehicle. During the past few years thousands of 'just as good' parts makers have foisted upon the market great quantities of cheaply made parts of a very doubtful quality. These imitation parts find favor only among unscrupulous 'get-rich-quick' repairmen who install them instead of genuine parts, reaping a much larger profit because they charge the same service fee that they would legitimately be entitled to if they used genuine parts."

Mr. Pulcher is not alone in his stand against the use of spurious or imitation parts. Practically all the leading truck manufacturers have sounded warnings from time to time against the use of any except genuine parts in repairing motor trucks. The Federal Motor Truck Company is devoting serious thought to the eradication of this evil among its customers. This company has always placed a low price on its repair and spare parts. It feels confident that accurate and genuine parts cannot be manufactured for less than it manufactures and supplies its own parts. Maintaining a fair price on its own parts, the company believes that it is entirely justified in insisting that its dealers use only Federal parts in repairing Federal trucks.

"Pennies saved are not pennies earned," says Mr. Pulcher, "when it comes to buying truck parts. I believe that every manufacturer of trucks is selling parts as cheaply as he can and still maintain the quality and accuracy so essential to perfect satisfaction when repair work is done. If some other parts maker sells parts more cheaply than the manufacturer does, you can rest assured that their quality is lower or their accuracy in doubt. The best economy is to buy parts only from the manufacturer or from some legitimate maker specified by the manufactuer."

Ninety per cent. of the farmers who responded to a survey made by the U. S. Department of Agriculture state that the factor of time-saving is the greatest advantage of trucks over horse-drawn vehicles. Even on short-hauls the motor truck requires only about half the time needed to make the same trip by wagon.

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Concrete Carries "Trolleys" and Heavy Traffic

By THECDOR S. OXHOLM
Chief Engineer, Borough of Richmond, New York City

ALTHOUGH third in size and least in population of the five boroughs comprising Greater New York, Richmond is by no means the least in the matter of providing public improvements for her citizens. Especially in the matter of good roads, has Richmond made notable progress, leading all of the other boroughs in mileage of concrete pavements.

Staten Island, which comprises the Borough of Richmond, is about 15 miles long and 7½ miles wide, with an area of about 57 square miles and a population of approximately 125,000. Beginning with a short stretch of concrete pavement, built as an experiment in 1916, Richmond has added to her mileage until to-day the borough has 18 miles of concrete highway, involving a total yardage of over 208,000.

Because of its location, Staten Island, in conjunction wtih the Municipal Ferry, forms a "short cut" from the industrial centers in southern New Jersey and points beyond to the busy marts of Manhattan, the heart of New York City. The trucking across the island is consequently of very heavy tonnage. This made the maintenance of the main arteries of travel so expensive that Calvin D. VanName, then borough president, and the writer sought diligently for a type of pavement that would "stand the gaff." Concrete was found to meet the requirements fully and it has consequently been adopted for the main traveled routes.

In 1916, when portland cement concrete was making a record for itself in the East, an experimental section, a little over a mile in length and 18 feet wide, was constructed on the Willowbrook Road. By the following year this road had so proved itself that an additional mile was paved. This was the beginning of a program of road construction that has now placed at the convenience of the public a continuous 18-mile stretch of concrete pavement, extending from Tottenville, at the southermost point of the Island, to within a mile of St. George, the landing point of the Municipal Ferry on the north shore. From St. George to South Ferry, Manhattan, is 5½ miles by boat. By using this short cut of 20 miles across New York Bay and Staten Island, trucks bound for Perth Amboy, Bayonne and points beyond, eliminate many miles of detouring through New Jersey.

Since the first concrete was placed on the Willowbrook Road, a steady improvement in design and construction has been made. As traffic became heavier, the section was changed from a 6-inch slab of 1:2:4 concrete to an 8-inch slab of 1:1½:3, concrete reinforced with 40-pound mesh. This latter design was used on the 8 miles of the Arthur Kill Road, paved in 1921.

The method of spacing joints is an interesting feature of the construction of Staten Island's concrete roads. A table was developed after careful study by which premoulded expansion joints were spaced according to the temperature of the air at the time of laying the concrete. By this plan the joints were placed 105 feet apart at a temperature of 96 degrees Fahrenheit and 40 feet apart at 42 degrees, with a sliding scale between these limits, calculated for each 5 degrees at a uniform rate of change. On the unreinforced pavements contraction joints of galvanized sheet iron, 1/16-inch thick and half the depth of the slab, were set at intervals of about 25 feet. Results have been excellent, as the concrete opened in a fine hair crack over the iron plate. The joint material was set at an angle of 80 degrees with the center-line of the pavement and where trolley tracks are close to the pavement the edges were protected with steel, embedded in the concrete.

A significant development of the use to which these concrete pavements are put is the establishment of a "trackless trolley" system operating over the highways of Staten Island. The first "trackless trolley" established in the city of New York was placed in operation on Staten Island in 1921, running from Four Corners to Linoleumville and the Sea View Hospital. These trolleys, which are really electric 'buses, weigh about 6 tons empty, and seat about 30 passengers. Power is taken from double overhead wires through a flexible pole attached to the top of the cars. This enables the cars to be operated in and around traffic on the road. They are easily swung to the right or left within the limits of the pavement. Where there is no obstruction, they can attain a speed of 35 miles an hour.

The route to the Sea View Hospital is over a bituminous macadam road surface on Bradley Avenue, while the line to Linoleumville over the Richmond Turnpike follows concrete for 1.7 miles and then another bituminous road to the terminus. Last spring Bardley Avenue was completely torn up by the trolleys in many places and in some cases temporary repairs had to be made at night in order that the trolleys could continue to operate. Yet the concrete on Richmond Turnpike came through this traffic test undamaged. As a result of these conditions, President Matthew J. Cahill of the Borough of Richmond, has secured funds for repaving Bradley Avenue with concrete and also Richmond Turnpike, where similar conditions exist, amounting to $238,000 in all. Plans and specifications have already been prepared for this work which is now being advertised.

MOTOR VEHICLE REGISTRATIONS AND REVENUES FOR THE FIRST HALF OF 1922.

State.	Total Trucks and Cars.	Taxis. Passenger cars.	Taxis. and 'Buses.	Trucks.	Trailers.	Motor-cycles.	Total Gross Registration Fees.	Total Gross Gasolene Tax.
Alabama	87,129	74,962	2,547	9,620	.....	598	$ 1,215,414.33	$.....
Arizona	33,121	32,996	125	(1)	.....	185	202,544.00	76,487.53
Arkansas(4)	74,947	67,900	.....	7,047	.....	192	900,000.00	175,000.00
California	723,439	689,163	.....	34,276	3,701	13,713	7,523,675.41	.....
Colorado	141,756	132,847	.....	8,909	54	2,118	898,029.66	300,707.14
Connecticut	129,900	105,560	2,127	22,213	69	2,144	3,155,631.34	348,473.54
Delaware	21,800	21,800	.....	(1)	66	338	384,727.00	.....
Dist. of Col.	64,992	57,568	1,408	6,016	.....	1,859	345,504.25	.....
Florida	102,789	84,901	2,139	15,749	390	946	1,440,494.93	(2)191,191.81
Georgia	126,500	112,500	.....	14,000	.....	877	1,704,515.49	340,684.02
Idaho	47,094	47,094	.....	(1)	.....	601	(2)675,201.57	.....
Illinois	676,748	591,437	.....	85,311	.....	6,063	7,193,861.31	.....
Indiana	425,000	380,000	.....	45.000	1,985	5,152	2,734,403.00	.....
Iowa	460,069	431,798	.....	28,271	96	3,089	7,315,221.94	.....
Kansas	288,742	269,065	.....	19,677	.....	1,714	3,449,151.00	.....
Kentucky	129,100	114,307	.....	14,793	.....	841	2,107,692.65	447,549.97
Louisiana	83,624	70,940	.....	12,684	.....	395	1,609,850.79	220,000.00
Maine	80,656	67,741	1,726	11,189	361	1,031	1,213,825.03	.....
Maryland (4)	130,631	120,776	.....	9,855	.....	3,752	2,339,000.00	(3)65,000.00
Massachusetts.	337,336	282,850	.....	54,486	435	8,708	4,588,038.55	.....
Michigan	493,247	442,055	.....	51,192	3,823	4,199	7,011,620.87	.....
Minnesota	335,750	300,750	.....	35,000	750	2,500	6,059,330.08	.....
Mississippi (4)	63,420	58,420	.....	5.000	.....	135	800,000.00	65,000.00
Missouri	346,623	310,822	.....	35,801	378	2,370	3,175,216.95	.....
Montana	52,550	47,000	.....	5.550	.....	246	539,820.00	121,790.28
Nebraska	216,902	198,717	.....	18,185	294	1,101	2,672,758.64	.....
Nevada	10,638	10,638	.....	(1)	.....	80	108,944.54	.....
N. Hampshire	42,608	42,608	.....	(1)	200	1,468	823,165.48	.....
New Jersey	287,859	216,418	7,794	63,647	724	7,364	5,449,955.35	.....
New Mexico	20,702	20,702	.....	(1)	.....	112	203,243.36	68,621.61
New York	866,094	674,119	30,398	161,577	2,705	21,382	10,950,091.57	.....
N. Carolina	162,942	147,488	.....	15,454	.....	1,275	2,200,000.00	400,000.00
North Dakota	88,719	86,354	.....	2,365	.....	584	613,990.60	.....
Ohio	760,000	650,000	.....	110,000	4,000	17,000	6,342,628.26	.....
Oklahoma	179,000	179,000	.....	(1)	.....	504	2,196,342.25	.....
Oregon	108,779	95,884	488	12,407	222	2,424	2,973,378.84	470,287.22
Pennsylvania	716,644	660,262	.....	56,382	869	15,704	11,046,479.55	1,597,200.89
Rhode Island	51,377	41,096	403	9,878	7	924	923,220.00	.....
S. Carolina	83,809	77,505	.....	6,304	39	497	690,962.66	216,901.57
South Dakota	111,447	103,731	.....	7,716	.....	481	760,000.00	.....
Tennessee	118,211	103,733	.....	14,478	.....	732	1,435,660.98	.....
Texas	449,246	449,246	.....	(1)	.....	2,831	3,906,230.09	.....
Utah	40,700	34,800	.....	5,900	65	565	646,815.25	.....
Vermont	37,454	35,276	.....	2,176	.....	669	680,741.22	.....
Virginia	150.000	130,000	.....	20,000	123	1,450	2,196,579.29	.....
Washington	183,997	154,340	2,235	27,422	665	2,934	2,980,017.00	405,950.21
West Virginia	90,250	81,600	4,600	4,050	64	950	1,656,435.14	.....
Wisconsin	359,230	334,905	.....	24,325	.....	4,877	3,834,499.00	.....
Wyoming	26,900	24,200	.....	2,700	10	250	290,596.75	.....
Totals	10,620,471	9,467,874	55,990	1,096,605	22,095	149,924	$134,165,505.97	$5,510,845.79

[1]Included with passenger-cars. [2]Collected January 1 to April 7, 1922, when tax was declared void. [3]Revenues for period January 1 to June 1. [4]Data approximate for state. [5]Law became effective June 1, 1922. [6]Where blanks occur these vehicles are included with passenger-cars.

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English Roads and Their Traffic

By FREDERICK C. HORNER

Formerly, Transportation Engineer, Packard Motor Car Company of New York

IN AN article published recently in an American technical magazine, the statement was made that in the future the roads of England will all be of concrete, 18 inches in thickness and that, even now, nothing but 18-inch concrete roads are being built there. This statement is entirely misleading. In order that those in America interested in good roads should not be misled by such an assertion—though I doubt whether any experienced engineer would be misled by it for a moment, when the cost of an 18-inch concrete road is considered—I will give the result of my personal investigation of this question, made on the spot during the last eight months, and in the course of which I have been able to obtain the opinions of some of the best road engineers in England.

First, I would state that, at the present time, there are no concrete public roads in England 18 inches thick, in fact none over 12 inches in thickness, and these are of clinker concrete and scarcely worthy of mention, as they are found only at a few places where the nature of the soil, marshy for instance, required a deep foundation. There are not over 50 miles of concrete road in the whole United Kingdom. One of the oldest pieces is to be found in Kent, and was laid about 1914. English road engineers are not by any means convinced that concrete roads are as good for English purposes as other types of construction. Therefore any report to the effect that the English roads are in future to be built of concrete is entirely without foundation.

As a matter of fact, it is extremely doubtful whether concrete roads will ever be proved to be best for English vehicular traffic. One of the main reasons is the large number of steel tired vehicles in use. By steel-tired vehicle I refer especially to the steam wagon. of which there are over 16,000 in the United Kingdom, and to the horse-drawn vehicle. The latter is still a big factor in road transport in England and some of the horse drays are of large capacity. The horses are heavy draft animals and consequently their big steel-shod feet cause considerable damage to the roads. Some of the steam wagons loaded are a gross weight of 12 to 13 long tons, and, although by law restricted to 5 miles per hour, often run at 10 to 12 miles per hour with consequent great damage to any road surface, but especially to a concrete surface.

In this connection the question arises whether the very satisfactory results given by concrete roads in America would have been obtained if as many steel-tired vehicles were in use there as in England. In England the best types of road are held to be asphalt and tar macadam. The foundation of the former is generally constructed of the old road-bed material minus the worn-out top. On this foundation is laid about 2 inches of bituminous concrete on which is put about 1.25 inches of sheet asphalt. The tar macadam road is a slag of tar macadam. Granite was tried, but found unsatisfactory. The perforations in the slag fill up with tar and bind the whole mass together in such a way that, when the road must be taken up for some reason, it is found that it is so closely knit together that it can only be removed in big pieces. The granite type on the other hand separates very easily in comparison because the surface of the stone is so smooth that the tar does not bind the pieces together as it does the slag.

The reason that wood blocks are so satisfactory as a road surface in England is due to the blocks being of soft wood. Hard wood blocks were tried on several occasions but were entirely unsatisfactory. The explanation is that the oak and other hard woods chip off on the edges, whereas the soft wood, pine largely, clings closer together and does not chip off. Most of the English wood blocks come now from Sweden and Norway. Wood block surfaces in England are not slippery as compared to the American wood block road surface. As pointed out to me, this no doubt is due to the practice of gritting the newly laid road with a gravel grit, from sand up to about the size of pea, and letting the traffic grind it into the blocks. This grit gives the blocks a rough surface, and, when they are dug up, it is found that they are still full of the grit. Another thing that is done in London and other English cities is to have bins of grit on the streets wherever there are hills and at points where traffic is very heavy. In wet weather the road surface is gritted and, although one frequently sees horses slip on the streets in London, it is uncommon to see a horse fall down.

Moreover, I have never seen a motor vehicle with skid chains on in London. There is very little snow and ice as a rule in London, but the streets are wet and muddy almost continually. In the north of England and in Scotland they have considerable snow and ice and therefore do use skid chains at times, but to nothing like the extent we do in America. An interesting fact in this connection is that in London all taxicabs are required to have one steel studded non-skid tire front and rear and on opposite sides. The results obtained are eminently satisfactory, as I have often had the opportunity to witness. Once I would have been run over but for a quick stop by a taxicab on a slippery street that would have been impossible without skid-chains or these non-skid tires. In America we all know how often a driver, to save tires and trouble, will neglect to put on skid chains when he should, thereby causing frequent accidents. In England the police regulations do away with this danger to the public, at least in so far as taxicabs are concerned. I am informed that eventually it is hoped to extend this regulation to all pneumatic-tired vehicles.

The opinion of those road engineers with whom I discussed the subject is that main trunk roads in England should be a minimum width of 24 feet and the county or feeder road not less than 18 feet. As to maximum width desirable, their views on this point can be judged by stating that, on one of the roads now being constructed in Middlesex County, Alfred Dryland, the engineer and surveyor, managed to have the width increased from 100 feet to 120 feet. Although this road is not being built to the full width of the right-of-way at present and walks and trees on both sides will be included in the 120 foot space, still it shows the vision of English road engineers in building their roads, where possible, not for the traffic of the moment alone, or for that of ten years hence, but for that of fifty years from now or more.

Incidentally Mr. Dryland went to America last summer to investigate our road building methods with special reference to the results obtained from concrete roads. The principal defects seen by him in American roads were their high crowns and their narrowness. Most of us will readily agree with him on both points, but especially on the latter. We all know the sensation caused by meeting a 7½-ton motor truck "crawling" along towards us at about 19 miles per hour and possibly drawing a trailer that is weaving slightly. In connection with the criticism of the high crowns of American roads, it may be stated that there are no crowns to English roads and the sides are not steep like ours, but rather flat.

Regarding the financing of our road-building, one criticism Mr. Dryland makes —and it is a fair one in my opinion—is that borrowing money on 30-year bonds is "too long a shot"; fifteen years is a much safer proposition for all concerned. In this connection it has been pointed out to me that in America the property owner benefits so greatly from the good road that passes his home that he should pay an equitable portion of the tax necessary to raise money to build good roads. This is undoubtedly true and should not be forgotten. Moreover, as I was reminded, the motor vehicle owner in America will probably have to pay a greater tax than at present. The rate at present is much lower than the English one and our need for new roads alone, aside from the maintenance and repair of existing ones, is far greater than England's ever can be. The principal reason for this lies in our vast distances, the thousands of square miles awaiting the coming of the good road that will develop them.

It is interesting to find that not only many of the motor vehicle operators, but some of the most experienced road engineers in Eng-

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land, are in favor of the gasolene tax in place of the system of taxing according to horse-power and tonnage now in operation in England and America. They reason that the fuel tax is a fairer method, as it seems only right that the vehicle that travels 10,000 miles per year over the roads should pay a higher tax than one that only travels 5,000 miles.

Regarding the weights and speed of motor vehicles the road engineers with whom I have discussed the matter are of the opinion that 12 tons gross at 12 miles per hour should be the limit for 4-wheeled vehicles with rubber tires for any road. If the limits are raised much above these figures, the roads will not stand up and then the whole proposition becomes uneconomical from all standpoints. In other words, it would cost far more to build and maintain the roads, which would mean higher taxes for the vehicle and the property owner.

I might add that in opposition to this view a prominent road engineer writes me on this subject as follows: "The motor-car acts at the present time limit the weight, size and speed of vehicles, but whether this is expedient or not is a matter for the legislators, and it is for them to prescribe the maximum and for road engineers to construct their roads capable of withstanding the wear and stresses resulting therefrom." My own observation on this point is that, unless legislators make wise laws, the taxpayer will suffer generally and the motor vehicle owner especially.

The report, that has been circulated in America to the effect that "over those 18-inch concrete roads in England they haul what they call steam lorries or traction engines, each engine pulling perhaps three cars holding 5 long tons each," is true to this extent. The steam wagons weigh unladen from 5 to 7 long tons and carry from 5 to 7 long tons live load. The capacity is usually the lower figure and sometimes as low as 4 long tons. One trailer behind is common practice. This type of vehicle is allowed to travel, when rubber tired, 10 to 12 miles per hour. Then there is the "traction engine" which weighs 14 to 18 long tons, is usually steel tired and hauls three 5-ton capacity trailers at a speed of 4 miles per hour. Thus, the gross load of all four vehicles is approximately 50 long tons. Three trailers is the maximum number allowed in one train. That this combination of road transport is growing in favor in England is not the case. In fact, I have never seen more than two trailers behind a traction in all the months I have been in England. The slow speed of this type of vehicle is sufficient reason to prevent it from becoming popular for anything except very heavy haulage, such as road-building contractors, heavy haulage companies, etc. "More speed, faster vehicles" is the watchword of the road transport user, and greater carrying capacity where consistent with economy and existing legal requirements.

Right here I would call attention to the fact that the overloading evil is not nearly as prevalent in England as in America. Some owners do overload, but it is not by any means the rule. In fact, I am inclined to believe it is the exception, and without doubt excessive overloading is rarely practiced. This is largely due to the fact that when the English make a law they usually abide by it, whereas we in America seem to make a law and then premeditate how to break it before it goes into effect.

Referring to the growth of the 6-wheeler, or tractor and semi-trailer, I find that road engineers believe its use will be beneficial to the life of roads, as the more evenly the load is distributed the better the results should be, both for the life of vehicle and road. Especially will this be true if the largest size rubber tires are used on all wheels. The 6-wheeler of 10 tons capacity traveling at 12 miles per hour would not do as much damage to the roads as the 6-ton capacity, 4-wheeled vehicle, traveling at the same speed.

Every one I have talked with is most emphatic in commending the research work being carried on by the Bureau of Public Roads, Department of Agriculture, at Washington in the tests on road impact and sprung and unsprung weight. And they regret that there is no similar body to assist the road-builders and truck manufacturers and operators in England, believing that it is only by these and other similar experiments and tests that we can arrive at definite conclusions as to what class of vehicle causes the greatest damage to the roads, and also get more light on what type of road construction stands the most wear. Of course, it is understood that no definite conclusions can be reached on this matter without taking into consideration the effects of weather, time and traffic.

The North Circular Road is one of the best and newest roads of concrete construction being laid in England. Although this road is of reinforced concrete, the value of reinforcement for concrete roads is not generally conceded as yet by English engineers, for as one engineer put it to me, "so far, the high cost is not justified by the results obtained." But another opinion I received in a letter is in favor of reinforcement in concrete road construction, and is as follows:

"If it could be found possible to prevent openings being made in roads after construction, undoubtedly the reinforcement of the foundations, provided it is scientifically carried out, is advantageous and secures prolongation of life. The reinforcement of concrete does not, in my opinion, necessitate additional expense for the reason that the reduction in the depth of the concrete by reason of the reinforcement covers the extra cost of the latter. What I mean is a road having an ordinary concrete foundation of 12 inches in depth would be no stronger than a road with 8 inches of concrete reinforced, and the cost of both constructions would approximately be equal."

At any rate, we have no reliable figures extending over a long enough period from which to form accurate conclusions on this question. Reinforced concrete roads are still in the experimental stage.

The oldest piece of concrete road in England, in Kent, is a 6-inch slab with a 24-feet roadway over which now pass about 1,200 tons per day. This road, although standing up very well, has not influenced the engineers of roads in Kent to build any other concrete roads. The fact of the matter is that the English road engineers are skeptical about the concrete road and it will take time to convince them that it is better than asphalt and tar macadam for English traffic.

It is interesting to note that there were no roads to speak of built in England for about 1,000 years after the Romans left and that the best roads until the advent of the motor vehicle, were built between about 1760 and 1830. The history of American roads is modern in comparison to England's, and we have accomplished wonders, considering the distances and the lack of coöperation due to there being separate states each with its own government and consequently no central controlling body such as exists in England. We have only to continue the work of educating the people on the value of good roads in order to have a system of roads that will compare favorably with England and France.

Prizes for Electric Slogan

New York electric truck dealers are offering a prize of $1,000 for an advertising slogan to be used in future electric vehicle publicity campaigns. The contest will open at once and will continue until the close of the Electrical and Industrial Exposition at the Grand Central Palace where the electric vehicle manufacturers will have a special exhibit showing electrical transportation methods. The first prize is $500, the second best slogan will receive $200, and $100 will be paid for the third. A prize of $5.00 each will be paid to next forty.

A booklet pointing out the advantages of electric trucks, and explaining their field of service has been prepared for the guidance of those who are not familiar with the storage-battery truck. This will be sent without charge to anyone asking for it. There is no limit to the number of slogans a person may submit but each must be on a separate card and must not exceed ten words. Suggestion will be received up to 5 P. M. Saturday, October 14, and they may be mailed either to the Electric Motor Truck Association, Central Park West and 62d Street, or may be deposited at the electric vehicle headquarters at the exposition.

$30,000,000 for Minnesota Roads

Minnesota will spend more than $30,000,000 for good roads again this year, according to official figures just compiled. About one-third of the available total will be used on the 7,000 miles state system of trunk highways under the Babcock plan and the remainder will be expended by county and township authorities on local roads or the secondary system.

Among the items on the trunk highway budget are 684 miles of extensions of Minnesota's system of gravel-surfaced roads and 386 miles of grading.

Trunk highway funds in Minnesota for 1922 include $5,650,000 of motor vehicle tax revenue, $2,563,000 of federal highway aid and $2,400,000 net of county reimbursement bond funds, all to be used on the trunk system.

State highway aid aggregating $2,200,000 was apportioned to counties and with nearly $18,000,000 of a local tax revenue will be used on the secondary highways.

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7-Year-Old Concrete Road Worn Less Than 1 Per Cent

AVERAGE MAINTENANCE $50 A MILE

After seven years of intensive service the Easton-Allentown concrete highway shows little effect from the continuous bombardment of heavy trucks and passenger-cars, according to C. E. H. Smith, district engineer of the Pennsylvania State Highway Department. Some scars have been the natural result of the seven years of service, but the veteran highway is to-day carrying its burden of traffic as satisfactorily as the day it was first opened.

This section of the William Penn Highway was the first section of concrete highway constructed by the Pennsylvania State Highway Department. Though many features in the design of this road are now obsolete, it represents one of the first pavements built in the east in which the design and methods of construction are comparable with the highly developed standards of to-day.

In 1915 a 3.35-mile section of this highway was built between Easton and Bethlehem. The pavement was built 6 inches thick at the sides, 8 inches thick at the center, 16 feet wide and of a 1:2:3 mix. Steel mesh reinforcement, weighing 25 pounds per 100 square feet, was placed 2 inches below the wearing surface of the slab. Expansion joints were placed at intervals of 39.5 feet.

The road is paralleled by a trolley line which encroaches on the right of way. This condition made extensive changes in grade impractical and created many different drainage problems which were responsible for most of the cracks which have developed.

A careful condition survey of this section was made during 1921. The investigation disclosed the fact that in spite of adverse conditions of location and drainage the heavy, concentrated traffic of six years had very little effect on the road. The 16-foot width was found to be inadequate and traffic was forced out onto the shoulders which, in some places, were badly torn up.

The overflow of traffic was so constant that the shoulders required continual upkeep for the safety of the traffic, a condition which was overcome somewhat by placing 2-foot penetration shoulders wherever space permitted during 1921. This greatly improved the drainage facilities and provided practically a 20-foot hard-surfaced road. The cost of construction of the penetration shoulders was approximately $2.11 per square yard. With a slight additional cost concrete could have been placed, which would have been of a more permanent nature and would require less maintenance.

The survey also developed the fact that 52 per cent. of the pavement slabs are without a crack of any kind. Transverse cracks were found on 30 per cent. of the slabs. Ten per cent. have both longitudinal and transverse cracks, while the remaining 8 per cent. have a longitudinal crack only. According to the method of judging the condition of pavements used by the Pennsylvania State Highway Department, 82 per cent. of the slabs are in perfect condition and the remainder are in good condition.

In the summer of 1920 a state-wide traffic census was taken on all the main traveled routes in Pennsylvania. The heaviest traveled section of the William Penn Highway was found to be this section in Northampton County between Easton and Bethlehem. On Sunday, July 25, this road was used by a total of 3,243 passenger-cars and 75 trucks. On the following day the number of passenger-cars fell to 1,002, while the trucks increased to 270. There were 159 motorcycles and 8 teams on Sunday and 60 motorcycles and 25 teams on Monday. The total number of vehicles of all kinds using the road during the 2-day period was 4,842.

After the road had been in service four years the State Highway Department took core samples to determine the condition of the road. Cores were drilled from the concrete slab with a 6-inch Calix drill. In a report published January 20, 1920, State Highway Commissioner Sadler said, "These cores show less than one-half of 1 per cent. depreciation after four years of the heaviest traffic. It is costing from $1,000 to $1,500 per mile per year to maintain the macadam on the Lincoln Highway. The maintenance of the durable road from which the cores were taken averages $50 per mile per year."

Before the shoulders were paved, the total cost of maintenance was approximately $150 per mile. Since the construction of the macadam shoulders, this cost has dropped to about $100 per mile, which includes taking care of all drainage as well as the shoulder up-keep.

Motor Trade in Canada

Canada's automobile factories increase steadily in number, and both foreign and domestic capital is flowing into the plants. Ownership of cars in Canada is one to every 18 people, or second among the countries of the world, and replacement of Canadian automobiles requires 80,000 cars annually.

Seventeen automobile plants, according to a report of the Canadian Pacific Railway, were in operation in Canada in 1920, with invested capital of $53,966,506 and production valued at $101,465,846. There were also 62 automobile supply plants capitalized at $15,332,887, with annual production valued at $19,361,882.

General Motors Corporation is concentrating the manufacture of many export models at its Oshawa plant, and Ford of Canada is beginning construction of an immense plant, adjacent to present factory. Capital invested in Canadian automobile plants has been almost entirely American, but British Capital is becoming interested. Announcement was recently made that a pioneer British concern will establish a branch factory.

In 1921, 15,620 passenger automobiles valued at $11,376,268, and 4,290 trucks, valued at $2,602,853, were exported. In 1919, figures were 11,613 passenger-cars and 2,567 trucks, worth $5,989,908 and $1,313,770, respectively. Markets cover the entire world and particularly Great Britain, most profitable markets are countries of the British empire where Canada receives benefits of many preferential tariffs.

Voiture de Grand Tourisme a New White Coach Product

CARRIES 24 IN LUXURY AND COMFORT

A new reflection of the rapid development that is taking place in the motor coach and bus field is found in the appearance of a foreign type of de luxe coach, known as *voiture de grand tourisme*, making a car for extensive touring. This type, which has just been brought out with Rubay coach work on a White Model 50 chassis is a faithful copy of the motor coaches which are operating between Paris and Monte Carlo.

The design was brought back from France by Leon Rubay, president of the Rubay Company, who found that the *voiture de grand tourisme* is one of the outstanding achievements of the French coachbuilders. A chassis designed especially for coachwork was needed, not only because of the size, lines and character of the French body, but on account of the higher type of service required of it.

The first of these coaches was dispatched from Cleveland on September 11, on a tour of eastern and coast resorts for the purpose of showing it to a number of hotels, clubs and transportation companies, which are interested in de luxe coaches. During the tour it will visit Erie, Buffalo, Rochester, Syracuse, Utica, Saratoga, Albany, New York, Philadelphia, Atlantic City and many resorts near those points. The striking appearance of the coach attracted crowds wherever it stopped.

In the design and appointment of this vehicle luxury's limit seems to have been reached. It has an inclosed drawing-room in the rear accommodating 12 persons and an open forward section, larger than the largest touring-car, accommodating 12 more. Baggage is carried on the roof of the inclosed section, for which purpose it is equipped with stairs reaching from the ground to the deck rail. When not in use the stairs are folded up and carried on the baggage deck. In case of storm the open section can be quickly sheltered by a single-bow top and by side curtains which ordinarily are concealed. The Rubay Company is authority for the statement that one French railway operates 175 of these cars in carrying patrons from its termini to resorts as far as 40 kilometers away. Five of them leave Paris every day during the Monte Carlo season, carrying their passengers over 800 miles. The popularity of this type abroad has extended even to Algeria, where a great many of them are in use.

Nothing which could add to the comfort or convenience of passengers has been omitted from the car. The drawing-room section is richly upholstered in expensive velour, the seats being extremely deep and soft. The interior abounds in appointments which will be appreciated by motor travelers. It is probably the most luxurious if not the largest motor conveyance of the kind which has been produced in America.

In three years ending 1920, records show 3,636 lives were lost and 10,644 people were injured at grade crossings in the United States.

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Parts Makers' Advertisers See Big Business Ahead

By EZRA W. CLARK

Advertising Manager, Clark Equipment Company

THE Advertising Managers' council of the Motor & Accessory Manufacturers' Association represents the advertising and sales activities of the more than four hundred leading companies making parts and equipment for the automotive industry included in the membership of the M. & A. M. A. It is the largest group of advertisers in America. From the members of this council go every week millions of separate mailing pieces; our billboards line the highways; our electric signs illuminate the busy thoroughfares of the cities; millions of readers give attention to our messages which appear in the principal papers every day; our appropriations are the main support of a strong and virile trade press represented by eighteen publications, which, as a class, are the best trade publications published in America, and there is not a magazine of general circulation published here which does not carry in every issue a number of pages of our advertising copy.

The most recent and accurate records available show that nearly $6,000,000 will be spent this year by our members in trade and general advertising. It is to be expected that in the handling of such large sums of money there will be some losses All of our advertising appropriations will not attain 100 per cent. efficiency, yet it is a function of this council so to guide and conserve the activities of its members that the advertising appropriation of every individual shall in a sense make more effective the advertising dollars of all the other members of the Association.

Membership in this council is dependent upon two things—affiliation of a company with the M. & A. M. A., and a desire to coöperate with fellow advertising managers in advancing the interests of the industry with which the member is identified and thereby making more valuable his service to his individual companies. No one is compelled to join the council. No one is made a member by reason of his position. It is a voluntary council composed of those who desire to make more effective their own work by helping to make more effective the work of others.

Present plans provide for three and possibly four meetings a year, of which it is hoped one will be a joint meeting with the advertising managers of the car and truck manufacturers associated with the National Automobile Chamber of Commerce; in fact, there are those of us who cherish the thought that some day we may have an Automotive Advertising Association embracing as active and associate members all those engaged in handling the sales, advertising and publicity of automotive products.

The council has no inherent executive authority. It creates and exercises its power through recommendations and endorsements. It is advisory only. Members not attending the sessions of the council receive full printed reports of its proceedings, and when the necessity arises, bulletins will be sent out to all interested. The direction of the activities of the council is vested in the hands of an executive committee composed of the following representative men:

S. E. Baldwin, Advertising Manager, Willard Storage Battery Company.

J. C. McQuiston, Manager, Department of Publicity, Westinghouse Electric & Manufacturing Company.

Joseph S. Jacobs, Advertising Manager, American Hammered Piston Ring Company.

Maurice Switzer, Kelly-Springfield Tire Company.

Chairman, E. W. Clark, Advertising Manager, Clark Equipment Company.

We have entrusted to our care something more valuable than the cash resources of our companies; we each have in our keeping their good names and reputations as well as the honor and integrity of a great industry. He who utters a false check may steal few or many dollars, but he who utters a false advertisement imperils the very integrity of his company—that upon which all credit inherently rests.

The immediate future holds much of promise and encouragement for the automotive industry as is shown by a series of telegrams from our leading manufacturers. We are striving for sales but do not let our advertising be competitive, by which I mean that we do not have to take sales from each other, but can help in the development of broader markets which will mean the sale of more and more cars and trucks. If we read the future accurately we will see a change in automotive advertising. We do not need to tell the public what the automobile is, but what it will do. The trend of the times shows that utility is coming to be a more vital factor in sales.

The last two years have seen a marvelous development in the motor 'bus field. We are now opening a new truck market which at one time seemed almost competitive. Street-railways are utilizing motor 'buses for feeders to their lines and steam railroads are supplementing their regular equipment with gasolene-motored coaches, which are, in fact, specialized motor 'buses. Another new market in the truck field is seen in the development of motorized grocery stores, which is growing rapidly in many sections.

Already the rural school system of America has been reorganized on a new basis because of the operation of motorized pick-up and delivery of school children and the supplanting of the little red school house by consolidated grade schools. Mail-order men tell us that we are now witnessing an entire change in the selling methods of the general store in small hamlets and rural communities. Enterprising merchants in these places are putting in light trucks for deliveries and utilizing the telephone to obtain orders, so that the small country general store is able to make more prompt deliveries than the great mail-order house. Bear in mind that the country merchant also knows all his customers within a short radius of his store by their first names. All these things show that the car and truck industry are entering more and more into the life and industry of our nation.

One of the problems to which our advertising council should give serious heed is that of the sale of products to other members of the association. A very large volume of the purchases of all members of this association is made from other members of the association, and a still larger percentage of our products goes to customers who are members of the National Automobile Chamber of Commerce. If this council is to be of economic value to itself and the industry, it must devise ways and means of reducing expense of purchasing from our own members and of selling to the members of our associated organization.

Need for Freight-Cars

Frank H. Alfred, president of the Pere Marquette Railway, has addressed an appeal to John C. Roth, director of the Interstate Commerce Commission, urging that body to "save the automobile industry and its workers."

Mr. Alfred suggested that all carriers use box-cars to the fullest extent possible, so that any surplus will be in the shape of automobile box-cars that can be used by that industry for moving its products. At the present time, he said, there are practically no cars available for moving automobiles at plants in Michigan, and, unless cars can be provided, these plants will have to be curtailed. Mr. Alfred called attention to the fact that manufacturers are now compelled to drive away automobiles on their own wheels. This practice is not good for the vehicles and can be done only in the case of short distances. With the approach of winter and the usual bad weather this practice will have to be abandoned.

It was also suggested by Mr. Alfred that railroads be instructed to use, so far as possible, automobile cars for loading shipments destined for Michigan, so that these cars will be available to the automobile industry.

Prosperity in the Detroit section, he concluded, is largely dependent upon the automobile industry and that industry is entitled to every consideration that can be given without injustice to the shipment of priorities, and if the automobile plant laborers are not kept employed it will create a very serious condition this winter.

John A. Rhue, treasurer of the Indiana Truck Corporation, has just returned from an extended trip through Missouri, Kansas, Oklahoma and Texas. He was very much impressed with the way business is improving, everything on the up-grade. A good fall and winter business is anticipated.

A survey by county agricultural agents reports a need for more motor trucks in 650 counties. Georgia reports the biggest demand for 59 counties, Pennsylvania is next with 43.

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Suggests That 'Bus Lines Pay 4% of Receipts as Tax

COMPETITION UNFAIR TO RAILWAYS

The District of Columbia Public Utilities Commission, in a decision made April 27, 1922, makes two particularly interesting statements: one a declaration that its authorization of a certain 'bus line in Washington induces people to withdraw their patronage from the street-railways, with resultant loss of revenue to the railways and a reduction of the gross-receipts taxes received by the district, a situation which the commission hopes to meet through adoption by congress of a bill requiring 'bus companies to pay a tax of 4 per cent of their gross receipts; and the other, the statement that, "so far as the safety of motor 'bus transportation is concerned, the commission desires to record its opinion that one-man street-railway cars, with regard to which there has been so much public clamor, are safer and more convenient than one-man motor 'buses." Furthermore the commission goes on record that "where additional transportation facilities are needed, they should be furnished by existing transportation agencies, either street-railways or motor 'bus lines, rather than by licensing of new companies."

The more important parts of this order are as follows:

"On April 19, 1922, the commission held a formal public hearing, after due notice, to consider the protest of the Washington Railway and Electric Company against the operation of motor 'buses by the Washington Rapid Transit Company from Rhode Island Avenue and North Capitol Street to Potomac Park and to Eighth Street and Pennsylvania Avenue, northwest.

"The Washington Rapid Transit Company has been operating a line of motor 'buses from 14th and Buchanan Streets. via 16th Street, to Potomac Park and to Eighth Street and Pennsylvania Avenue since March 1, 1921, under authority originally granted by order number 402 to William E. Reed on January 5, 1921, and subsequently transferred with the approval of the commission to the Washington Rapid Transit Company, a corporation chartered on January 20, 1921, under the laws of the State of Delaware with the said Reed as president. On July 22, 1921, this company applied to the Public Utilities Commission for permission to operate four extensions of its existing lines. The commission approved this application on August 4, 1921.

"The claim of the Washington Railway & Electric Company that the commission had no power to grant an extension of the lines of the Washington Rapid Transit Company does not appear to be well founded. That this latter company is a public utility seems certain from the definition of a public utility and common carrier contained in P. 1 of the act creating this commission. By virtue of this provision of law, the commission issued its order number 160, P. U. R. 1915E, 642, August 28, 1915, assuming jurisdiction over motor 'bus lines and similar common carriers; the Washington Rapid Transit Company has recognized the authority of the commission in such cases and has willingly subjected its operations to the control and regulation of the commission.

"It is alleged further by the protestant company that the operations of this 'bus line, as well as other lines of this company, are not only in direct competition with the service of protestant, but constitute unfair competition in that the Washington Rapid Transit Company, like other motor 'bus companies in the District of Columbia, is not subjected to the payment of a tax on its gross receipts, such as is imposed by law on the street-ralway companies, nor does it pay any portion of the salaries of crossing policemen nor for the maintenance of the street paving on the streets traversed by its vehicles, as is the case with the street-railway companies. These statements have been made before the commission in previous cases involving the operation of motor 'bus lines, and in the opinion of the commission constitute a justifiable basis for a claim of unfair competition. The action of the commission in authorizing the operation of these motor 'buses, taken as a result of public demand, induces people to withdraw their patronage from the street-railways, with the resultant loss of revenue to the latter and a corresponding reduction in the amount of gross-receipts tax collected from them by the District of Columbia. In order to correct the first of these inequalities, the commission now has in preparation a bill for submission to congress, by the terms of which all such motor 'bus transportation companies will be required to pay a tax of 4 per cent. per annum on their gross receipts from business in the District of Columbia. As to the payment of salaries of crossing policemen and for the maintenance of street pavements, the commission has endeavored in the past to secure and will continue to urge the enactment of legislation by Congress relieving the street-railways from these financial burdens.

"Motor 'bus transportation has become an important question in the District of Columbia, evidenced by the fact that 26 different individuals and companies using 85 vehicles are now operating under authority of the commission, and that there are pending five applications for additional lines. The commission believes that motor 'bus lines may render a service to the public and that they should be authorized whenever the public convenience and necessity justify. So far as the safety of motor 'bus transportation is concerned, the commission desires to record its opinion that one-man street-railway cars, with regard to which there has been so much public clamor, are safer and more convenient than one-man motor 'buses. The commission believes, moreover, that where additional transportation facilities are needed, they should be furnished by existing transportation agencies, either street-railways or motor 'bus lines, rather than by the licensing of new companies, particularly where local transportation is necessary. It has followed this course in the past and will continue that policy."

The officials of the Union Transportation Company of New Jersey estimate that they will save nearly $14,000 annually through the substitution of motor rail-car equipment for a steam locomotive and railroad cars.

New Vim Motor Truck Is Rated to Carry Half-Ton

MODEL OF NEW DESIGN THROUGHOUT

The Vim Motor Truck Company of Philadelphia has just announced an entirely new model in the new Vim of 1½-ton rating. The machine represents years of experience and development work and is in every sense a new design. Every feature of the old Vim has been reviewed and scrutinized with a view to improving wherever improvement was possible, the desire being to produce a model that would give maximum service at minimum operating and maintenance expense. The new design is the result of the new spirit injected by the new organization that has succeeded in the management of the old Vim property.

The new truck embodies a slow-speed low-compression engine, high gear ratios, and effective brakes in addition to the other well-known feature for which the old Vim was noted. The following specifications illustrate the many ways in which the former design has been bettered

Engine—Simplified heavy-duty type, 4 cylinders, cast *en bloc;* 4-inch bore, 5-inch stroke. Horse-power, S. A. E., 25.60—actual 39. No governor.

Clutch—Multiple disk, five driving and five driven plates, operating dry. Automatic take-up for wear.

Control—Left-hand drive with ball-socket type of gear shift. Emergency hand-brake lever.

Transmission—Selective type, 3 speeds forward and reverse. Alloy steel gears and shafts. Gear reduction; first, 3.24 to 1; second, 1.66 to 1; third, 1 to 1; reverse, 4.16 to 1. Gears have ¾-inch face.

Front Axle—I-beam section, drop-forged in one piece, alloy steel, heat-treated. Wheels mounted on tapered roller-bearings. Kingpins equipped with hardened steel bushings.

Rear Axle—Bevel-gear semi-floating type, fitted throughout with tapered roller-bearings and equipped with 16-inch diameter internal and external brakes. Road clearance, 9½ inches.

Drive-shaft—Double all-metal universal-joints of seamless steel tubing of large diameter.

Steering-gear—Worm-and-gear type with ball-thrust bearings; 18-inch diameter steering-wheel.

Frame—Pressed-steel channel section, 5-inch maximum depth. Tapered at front and rear ends to give correct load proportion. 160 inches long over all.

Front Springs—Semi-elliptic, 2 inches wide, 38 inches long, of alloy steel. Rolled tapered points equipped with 2 rebound plates.

Rear Springs—Semi-elliptic, 2¼ inches wide, 50 inches long, alloy steel taking both torque and drive. Plates are rolled with tapered points and are equipped with 2 rebound plates. Both front and rear springs bushed in eyes.

Radiator—Radiator core is tubular, fin type, with large frontal area, mounted in heavy drawn-steel case.

Wheels—Artillery type of second growth hickory; 12 spokes each, square spoke type interlocked at hub with steel felly both front and rear.

Carbureter—Compound jet type equipped with heating device in combination with "hot-spot" manifold. Non-adjustable. Control mounted on steering column.

Ignition—Battery and distributer type.

Lighting and Starting—Large capacity 6-volt storage-battery charged by engine-driven generator, provides ample current for starting, lighting and ignition.

Tires—Cord, front 32x4; rear 32x4.

Rims—32x4 demountable, straight-side split type.

Tread—56 inches.

Wheel-base—108 inches.

Gasolene Capacity—14 gallons.

Chassis Equipment—Electric headlights with approved lenses, tail-light, motor-driven horn, complete set of tools, dash, front fenders, gasolene tank, running-boards, jack, and pump.

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Heil Compartment Oil Tanks

There is an ever-increasing demand for fuel oil and light oils to be used for heat and power in manufacturing plants, schools, hotels, office-buildings and homes. The fuel being very heavy requires special truck tanks to handle it efficiently. The tank should be of large capacity and run very accurately as to gallonage, for the oil is not bucketed off, but hosed off in the fuel oil tanks. Tanks should not have more than two compartments at most, and each compartment should be fitted with three-inch outlets and three-inch pipe, with gate valve shut-offs. This equipment is in special demand in cities which have pipe-line connections and are not dependent on tank cars.

The illustration shows two fuel oil tanks built by the Heil Company of Milwaukee for the Murphy Miles Oil Company of Chicago. These tanks are of 1,600-gallon capacity, each compartment holding 800 gallons. A running board 12 inches wide is furnished, so that driver can stand on it when filling tanks. The Heil Company manufactures a complete line of compartment truck tanks in sizes from 250 to 2,000 gallons, with from one to five compartments.

All previous records for monthly production of gasolene in the United States were broken in July, when 569,711,415 gallons were produced, according to figures compiled by the United States Bureau of Mines. The July output of gasolene represents an increase of 44,000,000 gallons over the June production and 56,000,000 gallons above the figures for May. The increase over July of last year is 150,000,000 gallons.

Domestic consumption of gasolene for July was also the largest ever recorded in a single month, amounting to 566,000,000 gallons as compared with 507,000,000 gallons for June and 457,000,000 gallons for July of last year. The fact that consumption figures showed a larger increase than the production figures accounts for a reduction of stocks of gasolene for the month, amounting to 52,000,000 gallons. Thus, stocks on hand August 1 were 772,908,949 gallons, or 6.31 per cent. less than the figures for July 1, which aggregated 824,966,456 gallons.

The daily average of 1,593,000 barrels of oil was run through the stills of 305 refineries reported to the Bureau of Mines as operating during July. This shows an increase of 46,000 barrels or 2.96 per cent. in the amount of oil run and a decrease of 5 in the number of operating refineries as compared with June. Plants operating in July ran an average of 89.55 per cent. of their daily indicated capacity.

Imports of gasolene for July amounted to 4,840,098 gallons, exports were 58,630,402 gallons, and shipments to insular possessions were 1,866,789 gallons.

Kerosene production in July amounted to 192,924,420 gallons. Stocks of kerosene on hand August 1 were 324,586,128 gallons, an increase of 7,000,000 gallons during the month. Exports of kerosene for July were 50,398,000 gallons and shipments to insular possessions amounted to 419,000 gallons, showing jointly a decrease of 21,000,000 gallons from the June figures.

The output of lubricating oils in July amounted to 91,714,987 gallons, an increase of 11,577,000 gallons over June. Stocks of lubricating oils on hand August 1 were 226,690,749 gallons, a reduction of 213,000 gallons from the beginning of the month.

Tractive Resistance of Roads

Initial results secured from an investigation of the tractive resistance of roads indicate that information will be secured of great value to the highway engineer and the user of motor transport. The investigations are being carried on under the auspices of the Advisory Board on Highway Research of the National Research Council with which the Bureau of Public Roads, United States Department of Agriculture, and the Quartermaster Corps, United States Army, are coöperating.

One phase of the investigation shows that there is a great difference in the power required of the engine when a truck is traveling over different types of surfacing, the amount being more than twice as great on some of the lower types when compared with that on higher types. It is also shown that the power required to overcome the road resistance is not proportional to the speed of the vehicle and after a certain speed is reached increases very rapidly.

The investigation when complete will cover tests with various types of motor vehicles with the load, tire and spring equipment varied on different types of surfacing and at varying speeds. The data will include gasolene consumption, internal engine resistance, wind resistance and road-surface resistance.

When carefully analyzed it will aid the highway engineer in determining under a given set of conditions what type of surface should be built for a given volume of traffic to result in the least total cost for road and vehicle operation. The same sort of study will be made as to expenditures for grade reduction to reduce operating costs.

The truck operator will be given valuable information on the effect of tire and spring equipment, lubrication, size of load and speed of vehicle on fuel consumption which should aid him in producing cheaper transportation.

Seven cities in the United States have equipment in their local postal service of over 100 motor trucks. Chicago leads with 421. The others are: New York 318, Brooklyn (in Greater New York, but having a separate postoffice) 125, Boston 193, Philadelphia 193, Washington 111, St. Louis 108.

Two Heil oil tanks recently furnished to a Chicago concern.

Tire Output in July

The monthly report of the Rubber Association of America, compiled for the Bureau of Foreign and Domestic Commerce, shows that July, 1922, produced 2,476,636 casings, a decrease of 93,888 from July of last year. The production of tubes for these comparative months was about the same, this July showing an increase of 7,218.

The report follows:

SOLID TIRES.

1921—	Mfrs. Reporting.	Inventory.	Production.	Shipments.
Jan.	12	303,753	21,220	29,116
Feb.	12	304,374	23,365	29,599
March	12	283,800	27,710	43,926
April	12	269,985	28,859	42,080
May	12	264,663	35,156	40,122
June	11	240,336	28,395	49,867
July	11	220,003	35,123	55,678
1922—				
Jan.	11	182,000	40,000	33,000
Feb.	11	183,000	39,000	37,000
March	11	182,197	49,433	48,350
April	11	173,748	46,664	52,309
May	11	170,904	57,640	60,711
June	11	169,808	66,089	63,408
July	11	176,375	71,505	60,425

PNEUMATIC CASINGS.

1921—	Mfrs. Reporting.	Inventory.	Production.	Shipments.
Jan.	45	5,319,605	703,430	965,417
Feb.	45	5,193,018	819,892	1,073,756
March	46	4,597,103	1,163,314	1,614,651
April	49	4,527,445	1,651,418	1,785,951
May	59	4,451,668	2,100,917	2,085,882
June	63	4,154,456	2,313,265	2,643,850
July	63	3,892,037	2,570,524	2,757,581
1922—				
Jan.	66	4,174,000	2,055,000	1,597,000
Feb.	66	4,691,000	2,084,000	1,562,000
March	63	5,183,286	2,645,790	2,073,963
April	65	5,464,336	2,401,187	2,086,651
May	65	5,523,095	2,721,503	2,639,273
June	64	5,042,147	2,838,890	3,133,260
July	63	4,834,106	2,476,636	2,695,095

TUBES.

1921—	Mfrs. Reporting.	Inventory.	Production.	Shipments.
Jan.	47	5,586,163	740,824	1,042,617
Feb.	46	5,415,464	916,627	1,129,881
March	48	5,044,861	1,346,483	1,643,690
April	51	4,916,772	1,762,122	1,983,571
May	57	4,751,880	2,210,040	2,342,567
June	60	3,835,698	2,359,928	3,232,673
July	61	3,122,815	3,020,981	3,603,248
1922—				
Jan.	66	5,247,000	2,343,000	1,890,000
Feb.	65	6,142,000	2,597,000	1,703,000
March	63	6,991,118	3,017,511	2,090,737
April	65	7,230,096	2,650,573	2,329,343
May	65	7,189,552	2,970,696	2,938,947
June	64	6,186,534	3,130,629	3,973,679
July	63	5,675,839	3,068,199	3,630,744

Explanation.

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

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Gasolene Coaches for Railways

By CHARLES O. GUERNSEY
Chief Engineer, Service Motor Truck Company

SINCE the days of the first automobile, various attempts have ben made to design railroad equipment operated by gasolene engine. It seems rather remarkable that so little progress has been made, when one considers the place that the gasolene engine has in the marine, aeronautic, automotive, stationary and, in fact, practically every power field except the railroad. I am of the opinion that there are definite reasons why progress has been slow up to the present time. It is the purpose of this article to bring out these reasons and to show what the present field is for this class of equipment. The motor-coach will fill a decided need but it must not be considered as a cure-all. It has limitations.

One of the early attempts was that of Strang, which occurred about 1905. Previous to this, various efforts had been made to provide a single-unit car with steam. These cars were unsuccessful primarily on account of boiler limitations, the light fire-engine type of boiler being too expensive to maintain and the locomtive type too heavy. They had no particular advantage over the ordinary type of steam locomotive since they did not eliminate roundhouse supervision and the like. About 1910 the General Electric Company became interested in the problem and spent considerable time and effort in developing cars to be propelled by electric motors, the current for which was to be supplied by a 175 horse-power gasolene-engine, connected to an electric generator. Notwithstanding that a number of these cars were built, and some of them, in fact, are still in service. Generally speaking, they were not successful because the great weight, complication and maintenance expense made their operating cost almost as high as that of a steam train. Mr. McKeen, of the Union Pacific Railroad, seeing the need of something of this kind, developed the McKeen car, of which probably more have gone into service than any other up to the present time. Here again, the great weight necessitated an engine considerably larger than was commercially practicable, so that the total cost of operating the car was only slightly less than that of a steam train. Another reason why these early cars were not popular was that the builders failed to give due consideration to the economics of the situation. They attempted to have the same capacity, and speed in a gasolene car as in a steam train consisting of a locomotive and two cars. Wherever such capacity is required, the steam train can ordinarily be operated at a profit. The real field for the gasolene car is in service where the steam train has more capacity than is required. The heavy gasolene cars referred to above ran too near to the steam train in capacity, speed and operating cost. They did not fit the field.

About 15 years ago a car was built at the plant of the J. G. Brill Company, Philadelphia, on contract for the inventor. The engine was mounted in the center of the car, being connected by a silent-chain drive to a countershaft from which the drive was through propeller-shafts to two bevel-geared axels, one on either truck. Other cars have been built similarly, including those of Hall-Scott and Sargent. Cars that have failed did so because the designers failed to see the peculiar field of the gasolene engine.

It is generally conceded that for continuous heavy-duty work, engines having cylinders with a bore larger than 5 inches are not commercially successful. The troubles due to warpage, lubrication difficulties, the heating of valves and piston heads and the like become too great to handle. Apparently, the failure of these cars can be traced directly to the failure to appreciate the limitations of the gasolene engine.

On the other hand, builders of motor trucks for several years have equipped chassis ranging from ¾ to 5-ton capacity with flanged driving-wheels and with other means to adapt them to operation on rails. These cars, in general, have been successful. Due to light weight, low rolling-resistance, the small engines required, and to the fact that in some installations they can be handled by one man, the operating cost has been exceedingly low. These cars, however, being unduly limited in capacity and speed, fill only a limited demand. There still remains a middle-ground between the rail motor 'bus or the rail motor car, as we have known them in the past, and the proper field of the steam train. It is in this middle-ground that the motor coach can make a place for itself.

A motor-coach is defined as a passenger-carrying gasolene-driven railroad motor car, designed specifically for operation on rails. It is in no sense a converted motor-truck, but represents a combination of automotive and railroad practice. Previous attempts have been based almost entirely on one to the exclusion of the other. To illustrate, some of the earlier cars developed by the railroad men weighed more than 50 tons and required 300 horse-power, although seating capacity was provided for only some 50 or 60 passengers. They did not give due consideration to the automotive side of the design. Instead of building a gasolene car, they attempted to use a gasolene engine in a car of steam-train design.

By careful design and the use of alloy steel, anti-friction bearings and other approved features of automotive practice, the weight can be reduced materially. The weight must be held to a minimum to keep the motor-coach requirements within the capacity of proved gasolene-engines. It is also undesirable to forget the railroad point of view entirely. Many features of railroad design are the result of almost a century of development. The designer must weigh his problem carefully, choosing from railroad practice those features that fit this new type of equipment. The converted motor truck does not, according to experienced railroad officials, meet the requirements. Due to the use of 2-wheel driving trucks and other practices, it does not ride as steadily or as safely as the usual railroad car, which has a 4-wheel truck under either end of the car.

There is an insistent demand for several features not ordinarily included. Some of the more important of these are 4-wheel pivoted trucks, front and rear, full speed in either direction, air-brakes and safety applicances. The motor coach should combine the light weight of the motor truck with the safety, steadiness, comfort and convenience of the steam coach. One motor coach has an overall length of about 44 feet and a seating capacity of 38, in addition to drop seats for 8 passengers in the baggage-room, making a total seating capacity of 46. The baggage space is 70 square feet. The car is provided with standard vestibule doors for entrance, a saloon, comfortable seats, electric lights and other features commonly associated with modern railroad design. The total weight of this car is only 13 tons. This reduction of weight to less than one-third that of old-time motor cars of the same capacity, makes it possible to use a 68 horse-power engine, as against the 200 horse-power engine required by other types. At the same time a speed of 48 miles per hour has been attained a speed of 35 miles per hour can be maintained indefinitely, without damage to the mechanism. Due to the light weight and the correspondingly small amount of power required, a car of this type will show exceptional economy. The fuel-consumption is light, the car running between 5 and 7 miles per gal. of gasolene. Due, also, to the light weight, the car has very good acceleration, reaching a speed of 25 miles per hour in 30 seconds from a standing start. This car is arranged with two 4-wheel pivoted trucks. The drive is from the unit power-plant, located forward, through an auxiliary transmission, contained in the bolster of the front truck to the two axles of the front truck. The auxiliary transmission is arranged so that either of two pairs of gears can be used for transmitting the drive, thus, in effect, giving two "high" gears. One of these gears is proportioned for the ruling grade on the particular railroad on which the car is to be used, and the other is proportioned to give a maximum speed in straightway operation.

The success of the motor coach, after all, hinges primarily on the engine. The car must be designed with this thought always uppermost. The engine must be one that will stand up under the severest service. It must be capable of operating continually at high speed and under wide-open throttle with the minimum of vibration. Everything

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must be accessible and so arranged that repairs can be made quickly.

The gasolene-driven railroad motor coach will enable many branch lines and short lines that are now operating at an enormous loss to be converted to a money-making basis on account of the low cost of operation, maintenance and the like. A 13-ton car can be operated for 25 to 35 cents per car-mile, as against a cost of $1 to $2 for steam operation. The initial cost is low.

Frequent service could be given where it is not justified now by a steam train. A freight-carrying unit might be installed in conjunction with a passenger unit at an initial cost much below that of a passenger unit. The gasolene motor coach as a unit possesses many advantages over steam and electrified service; namely, speed, frequent service, low cost of operation, a crew of one or two men, the elimination of the usual terminal facilities and a great reduction in the initial cost. In conclusion, the railroad motor coach is primarily designed for service where steam operation is too expensive and frequent service is desired.

There is a small branch-line in the Blue Ridge Mountains that was getting only about $30 per day in passenger revenue while the operating cost with a steam train was $46 per day. A 30-passenger gasolene motor coach was installed and is running for about $10 per day or about 11 cents per mile; this is the total operating cost. Coal docks, water tanks, cinder pits, hostlers and the like are not necessary. That branch line, running from "nowhere to nowhere," is now making $20 per day profit. This sort of operation is a live issue with the railroads. As a result of this showing this road has put on a second car, and it is doubling its service voluntarily because it pays. The larger cars will vary in operating cost according to their capacity and speed. A car of this type can be operated for 20 to 30 cents per mile, depending upon the track, speed, number of stops and other conditions.

Mr. Hall, vice-president and general manager of the New Orleans & Lower Coast Railroad, states that the operation of its gasolene railroad motor car is costing 15 cents per mile, without depreciation. I understand that a trailer, to be installed in the near future, has been ordered. The Illinois Central Railroad is, of course, very much interested in anything that will reduce operating expenses. With this idea in mind the management has started an investigation covering the use of motor cars on branch lines. At the present time we do not know just what is desired in the way of a railroad motor car. On account of the race question in the southern territory, it is possible that a car which would be satisfactory on the northern lines would not answer at all in the southern districts. The investigation so far indicates that the handling of freight by motor car is not desirable, according to C. Chandler.

I think that about 75-horse-power would be the outside limit of engine capacity. Where the roads are fairly flat, it is possible to haul a light trailer behind one of the cars. Almost every case has to be considered alone. When hauling passengers and no express on an ordinary road having less than 1-per cent. grades, from 50 to 70 people could be handled. The time schedule is a governing factor.

It is well within the possibilities to build a car for way-freight service and for use where it might be required to handle one or two loaded cars. In fact, the operation of these cars can be pretty well illustrated by what is being done on the electric interurban lines. They haul way-freight in carload lots and by a trailer. These cases come up on branch lines, where the speed need not be more than 20 or 30 miles per hour. A car-and-trailer arrangement can be worked out, provided the speed conditions and grades are not too severe. We run about 700 miles per gallon of oil. As to the noise from the engine, and the vibration and rough riding due to the reaction from the driving axle being objectionable to the passengers, these are things we have set out to overcome. They are one of the reasons we are using two 4-wheel trucks.

A car running on the rails can starve a 'bus man to death. A 30-passenger 'bus operating on the highway costs about 30 cents per mile to operate, while one running on rails will cost about 12 cents per mile. These cars, because of their light weight, require very little expenditure for maintenance.

Hauling Carbon Dioxide at 8.7 Cents a Drum

By J. F. HARRISON

President, Southern Carbonic Company, Charlotte, North Carolina

In 27 months' operation our 1½-ton truck has cost only $100.00 for repairs, and has otherwise made a very satisfactory record. It operates for only $10.89 a day with driver and helper, and hauls for 8.7 cents per drum. It handles our work easily and has a considerable reserve capacity.

We are manufacturers of carbonic acid gas, which we ship to consumers all over this part of the country. In February, 1920, we purchased a Selden truck and equipped it with a stake body for hauling drums of carbon dioxide. A drum weighs 150 pounds full and 100 pounds empty. We always put 25 drums on the truck, if that large a load is ready. This is the maximum load, the average being only 15 drums.

Our product is sold chiefly to manufacturers of carbonated beverages, who order in small quantities and must be supplied regularly in order to hold their trade. This makes a dependable truck an essential part of our business.

The truck hauls the full drums to the four railroad stations, and brings back the "empties" which have been shipped back by customers. Shipments are usually made by express. The truck also delivers to a few local customers and collects "empties" from them. It runs between 15 and 20 miles a day, mostly over well-paved streets.

We figure that the truck will be good for 21,600 miles, or approximately 4 years; but the trade-in allowance justifies our depreciating it on the basis of 27,000 miles minimum life, or about 5 years. We have a good driver who keeps things tightened up. Relining our brakes and other minor repairs have not cost more than about $100.00 in 27 months. Therefore we feel that the allowance for repairs and maintenance should be less than $150.00 a year.

This truck costs $10.89 a day with driver and helper, 62.23 cents per mile, 8.7 cents per drum and 4.15 cents per drum-mile. Deducting the $6.80 paid to driver and helper, the cost per day is only $4.09.

In figuring the cost per drum we have considered an empty drum the same as a full drum. Calculations are based on shipping out 19,000 drums per year, which means that 19,000 drums per year are returned, making a total of 38,000 hauled. The truck could haul much more than this, if necessary, so it has a reserve capacity that will take care of future increases in our business for some time.

OPERATING RECORDS.

Total Period.

Period covered	2¼ years
Days operated	688
Total round trips	2,850
Deliveries, pickups	14,250
Loads out, drums	42,750
Loads in, drums	42,750
Total loads, drums	85,500
Miles traveled	12,040
Gasolene, gallons used	2,007
Cylinder oil, gallons used	86

Daily Averages.

Round trips	4
Deliveries, pickups	20
Loads out, drums	62
Loads in, drums	62
Total loads, drums	124
Miles traveled	17.5
Miles per round trip	4.3
Load per trip, drums, both ways	31
Drum-miles	262.5
Miles per gallon gasolene	6
Miles per gallon oil	140

COST RECORDS.

Investments.

Chassis, etc., complete	$2,600.00
Tire value	269.40
Total, less tires, to be depreciated	$2,330.60

Fixed Charges—Yearly.

Interest on total investment (5 years @ 6%)	$ 93.60
Taxes and licenses	32.50
Insurance	38.40
Garage expenses	120.00
Total per annum	$ 284.50
Total per month (per day $0.93)	23.71
Total for period	640.13

Variable Charges—Period.

Fuel at 25 cents a gallon	$ 501.75
Cylinder oil at 70 cents a gallon	60.20
Tires—12,040 miles ($269.40 ÷ 12,000-mile life)	270.90
Depreciation—12,040 miles ($2,330.60 ÷ 27,000-mile life)	1,039.05
Maintenance and repairs (estimated)	300.00
Total variable charges (per day $3.16)	$2,171.90
Driver's wages, helper (per day $6.80)	4,680.00
Total fixed charges	640.13
Total operating costs	$7,492.03

Unit Costs.

Cost per day operated	$ 10.89
Cost per mile traveled	.62
Cost per drum hauled	.087
Cost per drum-mile	.042
Repair cost per mile—estimated	.0249
Repair cost per mile—actual	.0083

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Crude Rubber Situation

The unstable condition of the world's rubber-producing industry is discussed in an official report of a British investigating committee just received by the Bankers' Trust Company, of New York, from its English Information Service. According to the committee's report the rubber growing countries of the world have an estimated production capacity in 1922 of 400,000 tons of crude rubber, while the year's consumption it is estimated, will not exceed 300,000 tons. The committee also estimated that the world's stored stock of crude rubber was, on January 1, 1922, 110,000 tons in excess of the necessary reserve for the year.

The above estimates are based on the following detailed statistics:

	Production in Tons. Plantation Rubber.	Wild Rubber.
Year.		
1920	335,000	35,000
1921	260,000	22,000
1922	380,000	20,000
	Consumption in Tons.	
1919	330,000	.....
1920	310,000	.....
1921	265,000	.....
Three-year average	300,000	.....
1922 (estimated)	260,000 to 300,000	
Stocks on hand January 1, 1922:		
In consuming countries	210,000 tons	
In producing countries	60,000 tons	
Afloat	40,000 tons	
Total stocks	310,000 tons	
Necessary stocks, equivalent to 8 months' consumption	200,000 tons	
Surplus stocks	110,000 tons	

The committee says that restriction to at least 75 per cent of normal plantation production would be required in order to reduce production to the level of probable consumption in 1922. It adds that unless a substantial inroad is made in existing surplus stocks during 1922 the restriction would have to be still more drastic.

Two schemes embodying restriction of output and a progressive duty on exports are recommended as offering a practical solution of the situation provided all rubber-producing countries adopt them.

Autocar Sprinkler and Flusher

Municipal officials in the District of Columbia have just put into service a new two-unit combination street-flusher and sprinkler which is mounted on 156-inch wheel-base 4-ton Autocar chassis. Part of the special equipment of this truck is an extra 4-cylinder 26-Y type Autocar engine which is used solely to drive a centrifugal pump. With that engine driving the pump it is possible to discharge 350 gallons of water a minute at a 35-pound pressure. Both engines are equipped with self-starters which are operated from a single battery. The controls for the pump engine are located inside the cab convenient to the driver. The controls for the flushing and sprinkling heads are mounted on the dash, also within easy reach.

There are four flushing nozzles, two at the front and two in front of the rear wheels. Each one is controlled by an independent lever and each is adjustable to any angle. There are also two slotted sprinkler heads in the front.

The 1,000-gallon tank is made in oval shape of 3/16-inch riveted steel. It is equipped with an 18-inch manhole, an overflow pipe, a trough board at each side, a clean-out plug, and has a water-level indicator on the rear.

Motor Vehicle Shipments Increase

Car loadings of motor vehicles for shipment by the Michigan Central Railroad from Detroit plants this year have far exceeded all past records, according to comparative figures formulated by E. D. Bronner, vice-president in charge there. A total of 55,045 car-loads of motor vehicles were loaded in the first eight months this year, as against 25,724 in the same period of 1921, at the Detroit stations of the Michigan Central, an increase of 114 per cent. August 1922 was the banner month of history, with loadings of 8,557 car-loads, topping even the five preceding months, each of which passed the 7,000-car-load mark.

Shipments for the months of July and August, during the height of the shopmen's strike, were far in excess of the traffic of 1921. During July this year 2,988 more car-loads, or 73.37 per cent., were loaded on the Michigan Central at Detroit than in July, 1921, or 7,060 car-loads as against 4,072. In August the increase was considerably larger, being 105.99 per cent., with a total outbound traffic of 8,557 car-loads this year compared with 4,154 cars in August 1921.

An unprecedented increase of 497.6 per cent., or 3,379 car-loads more than the 1921 figure, was shown in January, when 4,058 car-loads left Detroit, as compared with 679 in January 1921.

The comparative figures by months, with the percentages of increase, are as follows:

			Increase in	
Month.	1921.	1922.	Cars.	Per Cent.
January	679	4,058	3,379	497.64
February	1,740	5,409	3,669	210.85
March	2,948	7,246	4,298	145.79
April	4,580	7,761	3,181	69.45
May	3,914	7,290	3,376	86.25
June	3,637	7,665	4,026	110.69
July	4,072	7,060	2,988	73.37
August	4,154	8,557	4,403	105.99
	25,724	55,046	29,322	113.98

August was the high-record month for the New York Central Lines taken as a whole, as well as for the Michigan Central, the total loadings of this traffic for this system of railroads being 15,867 cars, an increase of 498 cars over the previous maximum of June 1922. The increase of August 1922 over the same month of last year was 102.4 per cent., the loadings of August 1921 having been 7,838 car-loads.

"Don'ts" for Drivers

To insure better care of its motor trucks by their drivers, one company operating a fleet of Republic trucks keeps the following list of "Dont's" posted in a conspicuous place on its loading platform.

"Don't try racing with a touring car; your truck was built for strength not for speed.

"Wash your truck frequently; a dirty car can spoil a lot of our advertising.

"Street-car tracks are nice on springs, but hard on tires—and steel costs less than rubber.

"Don't neglect a loose part, even though it seems to operate more freely that way.

"Don't forget to watch the other fellow ahead; a slow stop on your part nearly always costs you a punctured radiator.

"Use you brakes when getting 'spotted'; platforms were built to load from not for bumping posts.

"Don't drive too close to the curb; edge-trimming is fine institution for pie crusts, but too expensive for truck tires.

"The steering-wheel is vastly important, but it is well also to give the grease cups an occasional turn.

"Don't slide the rear wheels when stopping; rubber pavement polishers are too much of a luxury."

Durant Buys New Process Gear

Considerable speculation was aroused recently and confirmed to an extent by the widespread rumor connecting W. C. Durant's name with the delaying of the sale at auction of the New Process Gear Company, last remaining property of the Willys Corporation. However, on September 6, T. W. Warner, vice-president of Durant Motors, Inc., and president of the Toledo corporation bearing his name, purchased the Willys unit for $1,904,000, this being $4,000 in excess of the court's upset price. It is understood that the New Process Company will be made a subsidiary of the Warner corporation.

August Output 272,640 Machines

Carload shipment figures, reported to the directors' meeting of the National Automobile Chamber of Commerce at New York, indicate the best August business on record. A total of 272,640 cars and trucks were manufactured by all companies in the industry.

This is an increase over July of 12 per cent; last year August increased 1 per cent over July. The increase over August last year is 53 per cent.

This is by far the heaviest August output on record and is a close second to the record production for any one month (289,120) established in June. The previous August record was approximately 190,000 in 1920.

It indicates a total production of 1,671,418 vehicles for the first eight months of this year compared with 1,668,550 total production of all makers for the entire year 1921. The production by months follows:

	1921.	1922.
January	51,919	90,481
February	65,218	120,293
March	109,758	171,390
April	156,892	219,294
May	163,667	255,167
June	177,757	289,120
First half	725,211	1,145,745
July	176,067	244,355
August	178,831	272,640 (est.)

The Osgood Bradley Car Company, Worcester, Massachusettes, is said to have received an order for 15 trackless trolley cars from the City of New York. Most of the cars, costing $12,000 each, are for Staten Island lines. Motor equipment for the cars will be installed elsewhere, it is understood.

There are approximately 2,500 trucks and 1,500 tractors in use on the farms of Alabama, according to a survey recently completed by the State Department of Agriculture. This represents an increase of about 100 per cent. over the figures disclosed by last year's census.

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Two-Car Rail Motor Train

Just how far the manufacturers of gasolene railway equipment can go in the development of light cars and trains for the practical and efficient replacement of heavy trains is a question. Rapid strides have been made along this line in the past year or two and the rail-car has proved to be the correct solution of transportation difficulties on many short lines where traffic is light and steady losses have been sustained through the operation of steam trains.

Thus far manufacturers have confined their efforts, to a large extent, to the single car unit, either building bodies right on the chassis or building semi-trailer bodies, the front end of which are mounted on the power units. These methods have worked out very well, indeed, but in many cases they do not meet the requirements of the operators. For instance, a single car unit may be large enough to handle ordinary traffic on a particular railroad, yet at times during the season the traffic is heavier than usual and the capacity of the single car is inadequate to handle the rush.

Going a step farther than the single car gasolene railway unit, the Four Wheel Drive Auto Company, Clintonville, Wisconsin, has developed a two-car gasolene railroad train equipped with all-steel bodies built and mounted by the Pullman Company of Chicago. This train has just been completed and is being used for demonstration purposes at Chicago.

The bodies are finished in true Pullman style throughout and are capable of handling 46 passengers and baggage. The forward car of the train is the power unit and is divided into sections, one being reserved for baggage and motorman's compartment and the other being equipped to carry passengers and to be used as a "Jim Crow" or smoking section. The rear car is devoted entirely to the accommodation of passengers. It contains sixteen seats and accommodates 32 passengers very comfortably. Necessary precautions have been taken in the insulation of the bodies so that vibration and their attending noises are not communicated to the interior. Greater comfort is provided for the passengers through this arrangement than with the uninsulated body. With buses equipped with pneumatic tires and operated on the highways, most of the jars and vibrations are absorbed by the tires and springs, but when operated on rails and with the steel wheels meeting the steel rails, the jars when crossing rail joints and the noise of the vibration can only be partly absorbed by the springs; the remainder is transmitted to the body. Hence the necessity of body insulation to insure the maximum of comfort to passengers and a longer life to the equipment.

Among other modern devices this train is equipped with air brakes on both cars, M. C. B. couplers front and rear, electric starting and lighting devices, a heating attachment which is coupled to the engine exhaust, a device for sanding the rails, a powerful searchlight mounted on the forward car to be used for night running, and a locomotive type cow-catcher.

EXPORTS OF MOTOR TRUCKS AND PARTS, JUNE, 1922.

COUNTRY.	GASOLENE TRUCKS AND BUSES. 1 Ton and Less. (No.)	(Value.)	Over 1 to 2½ Tons. (No.)	(Value.)	Over 2½ Tons. (No.)	(Value.)	PARTS. (Value.)
EUROPE.							
Azores and Madeira Islands	...	.....	...	.....	...	.....	$ 49
Belgium	340	$ 84,405	...	.....	...	.....	12,554
Bulgaria	...	.....	...	.....	...	.....	845
Denmark	...	.....	...	.....	...	.....	671,178
Finland	12	2,905	...	.....	...	.....	.....
France	1	404	1	$ 800	...	.....	319,807
Germany	...	.....	...	.....	...	.....	782
Gibraltar	...	.....	...	.....	...	.....	1,612
Greece	1	404	...	.....	...	.....	1,987
Iceland and Faroe Islands	...	.....	...	.....	...	.....	127
Italy	2	808	...	.....	...	.....	1,944
Malta, Gozo and Cyprus Islands	...	.....	...	.....	...	.....	1,133
Netherlands	2	891	...	.....	...	.....	6,319
Norway	26	6,295	7	7,515	...	.....	9,495
Poland and Danzig	...	.....	...	.....	...	.....	13
Portugal	...	.....	...	.....	...	.....	1,194
Roumania	...	.....	...	.....	...	.....	833
Spain	62	15,428	...	.....	...	.....	183,677
Sweden	...	.....	...	.....	...	.....	15,680
Switzerland	...	.....	...	.....	...	.....	2,773
Turkey in Europe	...	.....	...	.....	...	.....	897
England	1	724	34	43,685	...	.....	415,108
Ireland	...	.....	...	.....	...	.....	2,287
Yugoslavia, Albania, etc.	1	414	...	.....	...	.....	.....
NORTH AND SOUTH AMERICA.							
British Honduras	...	.....	...	.....	...	.....	80
Canada	41	31,786	69	87,313	46	131,527	1,666,866
Costa Rica	1	404	...	.....	...	.....	3,985
Guatemala	...	.....	...	.....	...	.....	3,002
Honduras	...	.....	...	.....	...	.....	3,650
Nicaragua	...	.....	...	.....	...	.....	266
Panama	1	404	...	.....	...	.....	7,396
Salvador	...	.....	...	.....	...	.....	1,832
Mexico	110	43,629	6	5,125	19	16,792	69,931
Miquelon and St. Pierre Islands	...	.....	...	.....	...	.....	16
Newfoundland and Labrador	...	.....	...	.....	...	.....	2,268
Barbados	2	4,600	...	.....	...	.....	1,226
Jamaica	3	1,616	2	2,000	...	.....	6,274
Trinidad and Tobago	...	.....	...	.....	...	.....	6,137
Other British West Indies	6	2,270	...	.....	4	23,000	1,725
Cuba	4	1,437	7	7,298	...	.....	54,959
Dominican Republic	5	2,020	...	.....	...	.....	9,775
Dutch West Indies	1	404	...	.....	...	.....	888
French West Indies	...	.....	...	.....	...	.....	2,802
Haiti	...	.....	...	.....	...	.....	1,534
Virgin Islands of U. S.	1	404	...	.....	...	.....	168
Argentina	...	.....	...	.....	5	9,218	174,799
Bolivia	1	404	...	.....	...	.....	.....
Brazil	...	.....	...	.....	...	.....	88,113
Chile	6	2,698	...	.....	...	.....	7,821
Colombia	2	808	2	3,568	6	22,743	8,668
Ecuador	2	1,350	...	.....	...	.....	742
British Guiana	...	.....	...	.....	...	.....	21
Dutch Guiana	...	.....	...	.....	...	.....	658
French Guiana	1	404	...	.....	...	.....	3,716
Peru	2	808	5	4,472	...	.....	.....
Uruguay	...	.....	15	7,500	...	.....	11,503
Venezuela	6	3,186	...	.....	...	.....	5,586
ASIA.							
Aden	...	.....	...	.....	...	.....	180
Armenia and Kurdistan	...	.....	...	.....	...	.....	826
Ceylon	...	.....	...	.....	3	6,675	858
China	13	6,220	...	.....	...	.....	11,868
Kwantung	...	.....	...	.....	1	2,400	.....
Chosen	...	.....	...	.....	...	.....	980
British India	...	.....	14	16,478	...	.....	28,365
Straits Settlements	...	.....	...	.....	...	.....	5,901
Other British East Indies	...	.....	...	.....	...	.....	571
Other Dutch East Indies	...	.....	...	.....	...	.....	1,418
Java and Madura	...	.....	...	.....	...	.....	18,037
French Indo China	...	.....	...	.....	...	.....	1,532
Hejaz, Arabia and Mesopotamia	...	.....	...	.....	...	.....	250
Hongkong	...	.....	...	.....	...	.....	2,614
Japan	45	18,200	34	17,110	7	10,570	34,902
Palestine and Syria	2	808	...	.....	...	.....	5,386
Philippine Islands	...	.....	...	.....	...	.....	14,211
Greece in Asia	...	.....	...	.....	...	.....	1,061
Siam	...	.....	...	.....	...	.....	927
OCEANIA.							
Australia	...	.....	10	11,749	29	51,016	70,118
New Zealand	...	.....	7	10,386	2	2,836	23,054
Other British Oceania	...	.....	...	.....	...	.....	219
French Oceania	...	.....	...	.....	...	.....	454
Other Oceania	...	.....	...	.....	...	.....	8
AFRICA.							
Belgian Kongo	8	2,752	...	.....	...	.....	1,065
British West Africa	10	7,016	...	.....	...	.....	13,542
British South Africa	4	3,172	3	4,815	2	8,000	23,202
British East Africa	...	.....	...	.....	...	.....	2,054
Canary Islands	...	.....	...	.....	...	.....	7,842
Algeria and Tunis	...	.....	...	.....	...	.....	166
Other French Africa	...	.....	...	.....	...	.....	1,676
Egypt	...	.....	...	.....	...	.....	5,782
Morocco	...	.....	1	650	...	.....	3,333
Other Portuguese Africa	54	20,760	...	.....	...	.....	10,163
Portuguese East Africa	1	800	...	.....	...	.....	340
Spanish Africa	...	.....	...	.....	...	.....	70
Bermuda	...	.....	...	.....	...	.....	96
Total	780	$271,038	217	$230,464	124	$284,777	$4,089,772

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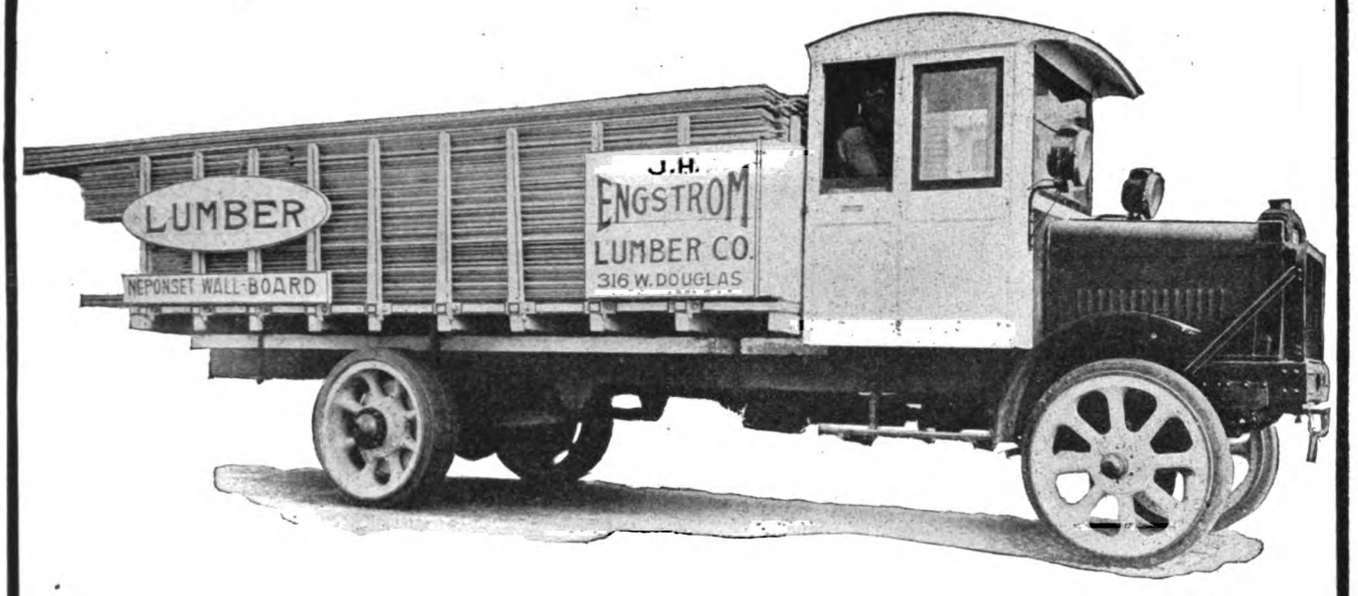

BROCKWAY

Have met with great success in using Smith Wheels as standard equipment on their 3½ and 5 ton models and as optional equipment on their trucks of lighter capacity. They are strong for Smith Wheel quality which is distinctive and far in the lead.

Trucks to have great lasting qualities and secure the last mile of service that each tire should give require that they be mounted on Smith Cushion Wheels, both front and rear. They save in upkeep each year more than their cost.

Smith Wheels are made in three types: rigid, pneumatic and cushion—each a peer of its class.

SMITH WHEEL
SYRACUSE, N.Y. U.S.A.

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Will Discuss Highway Courses

Increasing interest in the forthcoming conference on highway transport and highway engineering education, to be held by the Highway Education Board in Washington, October 26 to 28, is reflected in replies to invitations from educators and men high in the councils of the automotive industry. It is estimated that at least 300 regularly invited delegates will be present, with approximately half as many more in attendance who are concerned in the problems to be studied. Headquarters of the conference will be the New Willard Hotel.

The program has reached the stage of final approval, the committee appointments now being made. Educators are inclined to stress the work to be done in committee conference, while outside this circle interest is attached to the inspirational addresses expected from persons who are now receiving invitations.

Ten committees are now preparing reports for submission to the conference as a whole. They will function with an educational chairman directing the research of their respective committees. H. W. Leavitt, assistant professor of civil engineering, University of Maine, is educational chairman of the committee on "Required and Elective Undergraduate Subjects in Highway Engineering." L. W. McIntyre, assistant professor of civil engineering, University of Pittsburgh, is educational chairman of the committee on "Required and Elective Undergraduate Subjects for Highway Transport Business and Engineering Positions." On the committee "Subject Matter of Basic Required Undergraduate Course in Highway Engineering," L. E. Conrad, professor of civil engineering, Kansas State Agricultural College, will serve as educational chairman.

Other educational chairmen and their committees are: C. B. Breed, professor of civil engineering, Massachusetts Institute of Technology, "Subject Matter of Basic Undergraduate Course in Highway Transport," C. C. Wilcy, assistant professor of highway engineering, University of Illinois, "Subject Matter of Undergraduate Course in Highway Engineering Theory and Design." C. A. Baughman, professor of civil engineering, Alabama Polytechnic Institute, "Subject Matter of Undergraduate Course in Highway Engineering Laboratory;" Charles S. Howe, President Case School of Applied Science, "Nature and Content of Supporting Non-Technical Courses in Economics and English;" H. C. Smith, assistant professor of highway engineering and highway transport, University of Michigan, "Graduate Work in Highway Engineering and Highway Transport;" C. C. Albright, professor of civil engineering, Purdue University, "Conferences or Short Courses on Highway Engineering and Highway Transport;" H. J. Hughes, Dean Harvard Engineering School, "Teaching Highway Traffic Regulation and Safety."

Motor Thefts Being Checked

That the Dyer anti-theft automobile law is working effectively is evidenced by the fact that 2,120 stolen motor vehicles have been recovered, and that 2,773 arrests have been made, out of which 1,113 persons were convicted, with an average sentence of about two years per person. The main point in the law is that the transportation of stolen motor vehicles from one state to another is an act coming under federal jurisdiction and hence punishable in federal courts. The law has been in effect since October 1920. The good work has been done by the Bureau of Investigations, United States Department of Justice.

EXPORTS OF MOTOR TRUCKS AND PARTS, JULY, 1922.

COUNTRIES.	GASOLENE TRUCKS AND BUSES. 1 Ton and Less. (No.)	(Value.)	Over 1 to 2½ Tons. (No.)	(Value.)	Over 2½ Tons. (No.)	(Value.)	PARTS. (Value.)
EUROPE.							
Austria	1	$ 404	...	.....	..	.....	.....
Belgium	170	38,031	...	.....	..	.....	$ 12,019
Czechoslovakia	2	1,000	...	.....	..	.....	25
Denmark	17	4,061	...	.....	..	.....	221,145
Finland	...	.....	...	.....	..	.....	248
France	1	217	...	.....	..	.....	242,101
Germany	...	.....	...	.....	..	.....	106
Gibraltar	...	.....	...	.....	..	.....	430
Greece	2	808	...	.....	..	.....	1,728
Iceland and Faroe Islands	...	.....	...	.....	..	.....	1,573
Italy	...	.....	...	.....	..	.....	24,551
Malta, Gozo and Cypress Islands	...	.....	1	$ 1,200	..	.....	1,305
Netherlands	...	.....	2	1,614	..	.....	8,932
Norway	2	483	...	.....	..	.....	7,176
Poland and Danzig	...	.....	...	.....	..	.....	504
Portugal	1	500	...	.....	..	.....	4,821
Russia in Europe	...	.....	...	.....	..	.....	109
Spain	...	.....	...	.....	..	.....	28,254
Sweden	...	.....	...	.....	..	.....	16,175
Switzerland	...	.....	...	.....	..	.....	825
Turkey in Europe	...	.....	...	.....	..	.....	3,921
Ukraine	2	1,500	...	.....	..	.....	3,136
England	...	.....	49	71,973	..	.....	207,103
Scotland	...	.....	...	.....	..	.....	440
Ireland	...	.....	...	.....	..	.....	12,228
Yugoslavia, Albania, etc.	...	.....	...	.....	..	.....	160
NORTH AND SOUTH AMERICA.							
British Honduras	...	.....	...	.....	..	.....	242
Canada	33	22,028	48	75,892	46	$127,777	1,522,057
Costa Rica	...	.....	...	.....	..	.....	1,015
Guatemala	...	.....	...	.....	..	.....	1,861
Honduras	...	.....	...	.....	..	.....	2,996
Nicaragua	...	.....	...	.....	..	.....	68
Panama	...	.....	...	.....	..	.....	5,943
Salvador	...	.....	...	.....	..	.....	1,294
Mexico	95	32,156	8	11,724	2	2,000	63,603
Newfoundland and Labrador	...	.....	...	.....	..	.....	1,653
Barbados	2	4,000	...	.....	..	.....	1,210
Jamaica	6	2,424	...	.....	1	150	6,198
Trinidad and Tobago	5	2,020	...	.....	..	.....	3,425
Other British West Indies	3	1,380	13	12,246	..	.....	2,071
Cuba	26	8,971	...	.....	..	.....	46,247
Dominican Republic	8	3,232	2	3,597	..	.....	5,906
Dutch West Indies	...	.....	...	.....	..	.....	948
French West Indies	...	.....	...	.....	..	.....	1,453
Haiti	...	.....	2	4,075	..	.....	3,469
Virgin Islands of U. S.	1	345	...	.....	..	.....	278
Argentina	...	.....	1	820	1	4,200	26,673
Bolivia	...	.....	...	.....	..	.....	48
Brazil	40	9,557	...	.....	18	57,358	37,996
Chile	6	2,760	3	2,989	1	3,342	6,887
Colombia	...	.....	1	871	..	.....	6,144
Ecuador	3	4,230	...	.....	1	5,350	2,844
British Guiana	...	.....	...	.....	..	.....	1,483
Dutch Guiana	2	880	...	.....	..	.....	813
Peru	18	7,272	...	.....	2	9,800	10,367
Uruguay	...	.....	...	.....	..	.....	8,008
Venezuela	3	1,212	1	3,910	..	.....	8,167
ASIA.							
Aden	...	.....	...	.....	..	.....	221
Ceylon	...	.....	1	2,400	..	.....	1,374
China	2	1,000	...	.....	..	.....	6,813
Kwantung	...	.....	...	.....	..	.....	1,750
British India	1	800	6	7,193	..	.....	31,958
Straits Settlements	...	.....	...	.....	..	.....	8,893
Java and Madura	...	.....	...	.....	..	.....	13,646
Other Dutch East Indies	...	.....	...	.....	..	.....	1,750
French Indo China	...	.....	...	.....	..	.....	64
Hejaz, Arabia and Mesopotamia	...	.....	...	.....	..	.....	5,141
Far Eastern Republic	...	.....	...	.....	..	.....	44
Hongkong	...	.....	...	.....	..	.....	1,024
Japan	75	30,300	12	37,198	4	6,368	21,035
Palestine and Syria	1	750	1	2,800	..	.....	11,456
Persia	...	.....	...	.....	..	.....	1,662
Philippine Islands	...	.....	...	.....	..	.....	6,382
Greece in Asia	...	.....	...	.....	..	.....	20
Siam	...	.....	...	.....	..	.....	234
OCEANIA.							
Australia	5	9,311	18	20,042	15	21,772	44,843
New Zealand	2	1,515	6	14,013	3	8,120	31,159
Other British Oceania	...	.....	...	.....	..	.....	362
French Oceania	1	590	...	.....	..	.....	1,327
Other Oceania	...	.....	...	.....	..	.....	1,196
AFRICA.							
Belgian Congo	8	2,752	...	.....	..	.....	128
British West Africa	...	.....	11	13,633	..	.....	7,201
British South Africa	...	.....	...	.....	..	.....	32,184
British East Africa	...	.....	...	.....	..	.....	1,764
Canary Islands	...	.....	...	.....	..	.....	8,097
Other French Africa	2	808	...	.....	..	.....	57
Egypt	...	.....	...	.....	..	.....	3,089
Portuguese East Africa	...	.....	...	.....	..	.....	83
Other Portuguese Africa	6	2,424	...	.....	..	.....	.....
Total	552	$199,721	186	$288,190	84	$246,237	$2,825,335

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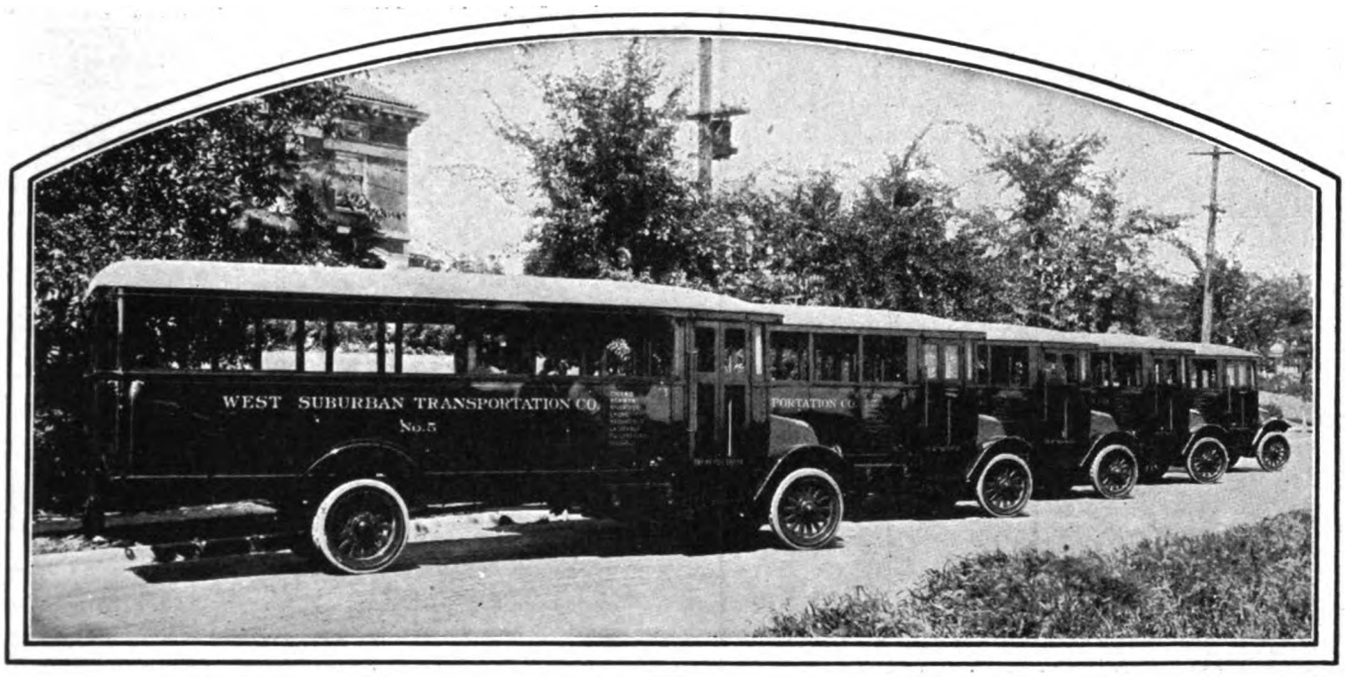


The New Model 52 Opens Up Another Market to the International Motor Truck Dealer

EVERY DAY new bus transportation companies are being formed, or established companies are adding to their fleets. This business is at the doorstep of the energetic motor truck dealer—and the man who sells Internationals can profit now through the introduction of the new Model 52 special motor bus chassis. This model, with its long wheel base, high road speed, ample passenger capacity, and other special features, is a valuable addition to the already complete International haulage line. There is now no phase of industrial or passenger transportation closed to the International Motor Truck dealer.

Remember the motor bus! It is already a power in the successful transportation of passengers. Great fleets are being operated in and around all of our larger cities, and nearly every community has one or more lines running to and from neighboring cities. Don't let this attractive business slip through your fingers! For the larger enterprises you can sell the Model 52, and for lighter duty, the Speed Truck (chassis $1250, f. o. b. factory) equipped with standard cross-seat body. Begin to prepare now to put more and more of these busses into service in your territory. If you are not already an established International Motor Truck dealer, you will do well to write for complete dealer information. There is good motor truck and bus business all around you—and you can get your share of it through the International Line of "Low-cost Hauling" Trucks.

Don't delay—Our catalog and information is ready now!

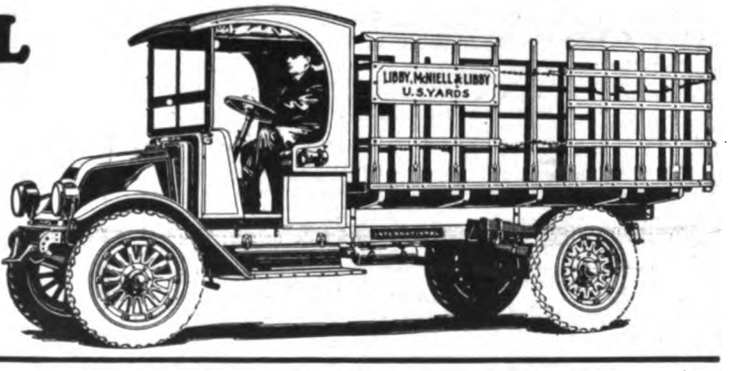
INTERNATIONAL HARVESTER COMPANY
OF AMERICA
(INCORPORATED)
CHICAGO U S A

93 Branch Houses in the United States

INTERNATIONAL MOTOR TRUCKS

Sizes:
2,000-lb. Speed Truck

Model 21, 2,000-lbs.	Model 52, 5,000-lbs.
Model 31, 3,000-lbs.	Model 61, 6,000-lbs.
Model 41, 4,000-lbs.	Model 101, 10,000-lbs.



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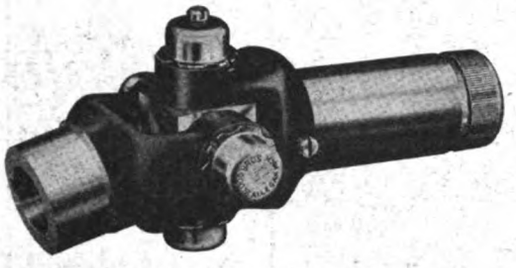

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DRIVE GEARS DRIVE PINIONS

Both at Syracuse, N.Y.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of The Power Wagon, published monthly at Chicago, Illinois., October 1, 1922.
State of Illinois, County of Cook—ss.

Before me, a Notary Public in and for the state and county aforesaid, personally appeared C. Freeburg, who, having been duly sworn according to law, deposes and says that he is the business manager of The Power Wagon, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher, The Power Wagon Publishing Co., 544 Lake Shore Drive, Chicago, Illinois.
Editor, Stanley A. Phillips, 544 Lake Shore Drive, Chicago, Illinois.
Managing Editor, None.
Business Manager, Walter Wardrop, 544 Lake Shore Drive, Chicago, Illinois.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.)
The Power Wagon Publishing Co., 544 Lake Shore Drive, Chicago, Illinois.
Walter Wardrop, 544 Lake Shore Drive, Chicago, Illinois.
Stanley A. Phillips, 544 Lake Shore Drive, Chicago, Illinois.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.)
None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

C. FREEBURG, Business Manager.

Sworn and subscribed before me this 29th day of September, 1922.
RAYMOND E. OLSON, Notary Public.
(SEAL) (My commission expires March 28, 1923.)

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MOTOR TRUCKS

Model 33, 1½-2 Ton Bus

Operated by

STAR TRANSPORTATION COMPANY
MASON CITY, IOWA

SWIFT - ECONOMICAL - POWERFUL

Denby Motor Truck Company
DETROIT, U. S. A.

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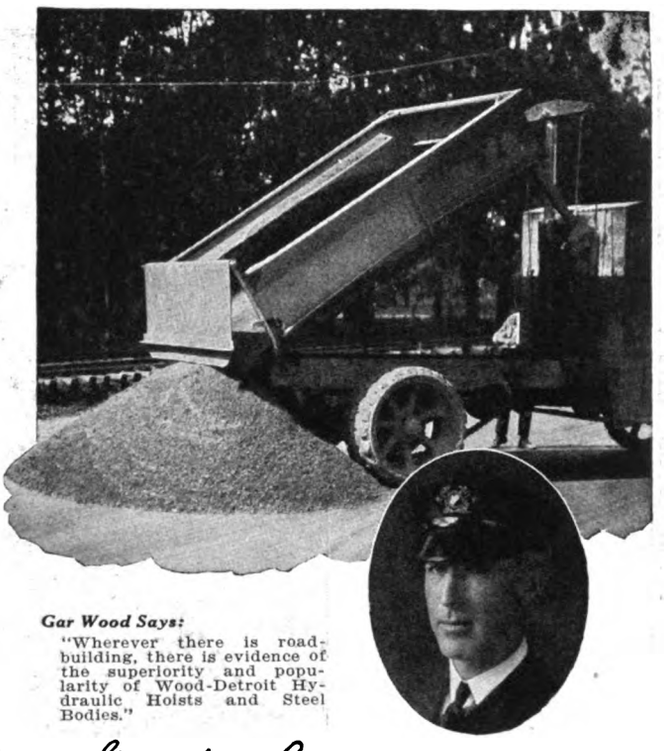

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Built by Gar Wood

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For these better hoists and bodies far outnumber all other makes combined.

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Hydraulic Hoists and Steel Bodies

Produced in the largest and finest plant in the world devoted exclusively to the building of hydraulic hoists and steel bodies, and built to the highest standards of material and workmanship, they represent a value that is beyond competition—the choice of over 90% of the truck makers.

Be sure you specify Wood-Detroit Hydraulic Hoists and Steel Bodies.

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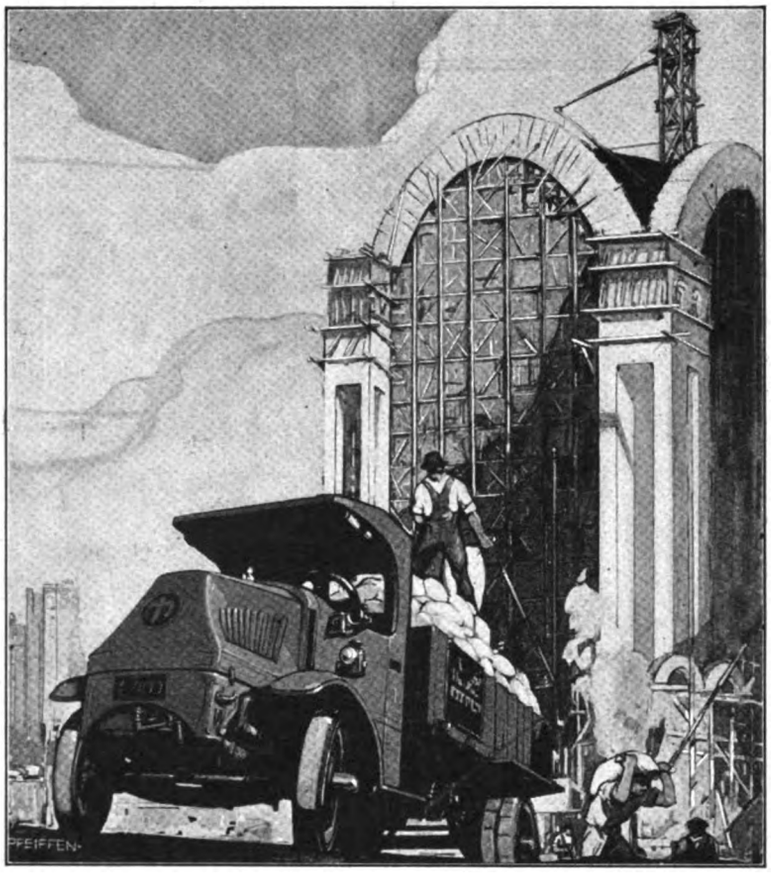

Sales resistance down —Profits up

This, briefly, has been the experience of far sighted dealers who saw the selling advantages of a *manufactured* motor truck.

When you talk Mack, you are talking about a *known* product with a *known* record of achievement behind it.

The value of a Mack franchise lies in the fact that it *does* lower sales resistance and it *does* raise the earnings of the dealer who acquires it.

There may be some territory available in your vicinity. Inquire today—now.

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25 Broadway, New York City
Branches owned by this Company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK INTERNATIONAL MOTOR TRUCK CORPORATION."

Capacities 1½ to 7½ tons. *Tractors to 15 tons.*

Mack TRUCKS

PERFORMANCE COUNTS

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LATEST ROLLER CHAINS HAVE SPECIAL QUALITY
SOLID ROLLS AND OTHER IMPORTANT IMPROVEMENTS

HIGH EFFICIENCY
ROLLER AND SILENT TYPE
CHAINS

also *Low* Cost per *Thousand Miles* of Service

Front End Motor Chain Drives

EXCEPTIONAL MILEAGE AND NEVER KNOWN
TO SKIP THE SPROCKET TEETH

THE WHITNEY MFG. CO.

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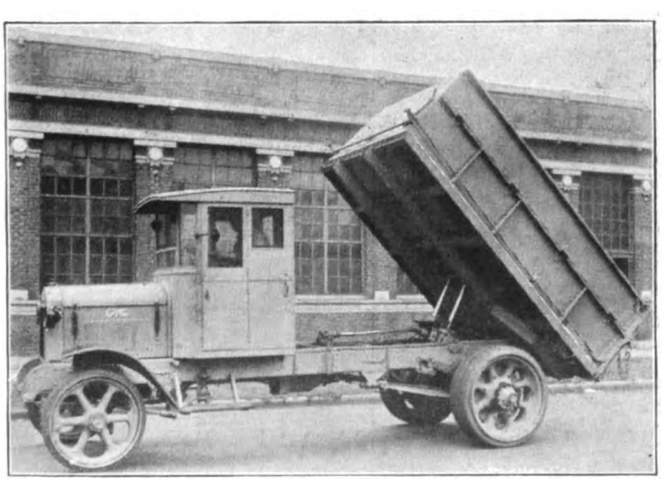

5-ton G. M. C. with Coal Body and Hydro Hoist

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The Standard Dumping Equipment for Motor Trucks

You can recommend a Heil Hoist and Dump Body to your customers with the positive assurance that it will give 100% service. We build bodies in various capacities for all kinds of dump work.

Catalog 120 gives complete details on Bodies and Hoists as well as on Gravity and Express Bodies for Ford Trucks, Hand Hoists and Compartment Truck Tanks. Write today for prices and discounts.

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1140 Montana Ave. Milwaukee, Wis.

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Lee Automatic Dump Body

DUMPS WITHOUT POWER

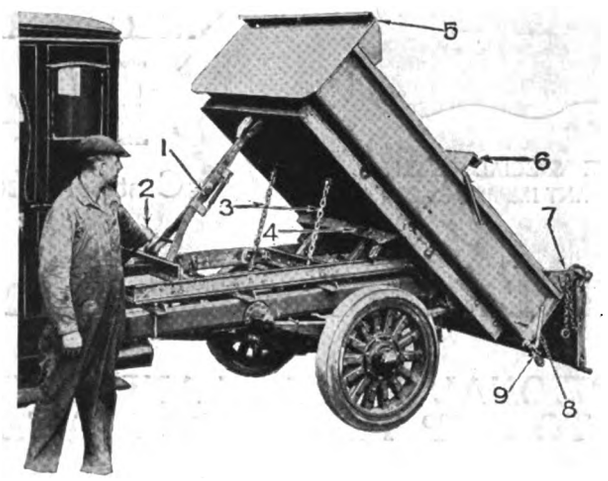
1 **Folding Standard** — automatically locks body in dumping position.

2 **Control Lever**—automatically locks body in traveling position.

3 **Check Chains**—Prevent malalignment of body on uneven ground.

4 **Roller Segment** — rolls on a low track, giving low overall height.

5 **High Dumping Angle**—moves the stickiest material quickly.



6 **Partition**—divides the load for multiple batch hauling. ($25 extra).

7 **Spreader**—lays gravel, stone, etc., evenly and efficiently.

8 **Gate Control** — affords automatic and manual operation.

9 **Lowest Dumping Point** — gives ample ground clearance.

ELIMINATE TRUCK TROUBLES

LEE BODIES eliminate half the total troubles of a dump truck, as it does not use a HOIST with its numerous complicated parts that are subject to improper installation, adjustments and wear, road shocks, vibrations, exposure to dirt, dust, weather, etc., etc.

INCREASE DAILY TONNAGE

The conventional type of mechanical-operated dumping body is a highly complicated mechanism, high in first cost, high in selling price, and high in up-keep expense, and the very quality that makes its production cost unnecessarily high—its great and needless complexity of construction—is the quality that makes it undependable, liable to frequent service interruptions and a source of lasting grief to buyer and seller alike.

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By eliminating the complications inherent in power-operated dumping bodies, an economy in first cost of about 40% has been made possible, while every advantage of these types has been retained without their disadvantages — costs of maintenance and loss of time for repairs, excessive weight and unnecessary high price.

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POWER WAGON

NUMBER 216 CHICAGO, NOVEMBER, 1922 Price 25 Cents

Back of every perfected achievement of man
SPECIALIZATION

The modern sky-scraper is the development of the building progress of the last decade, a progress entirely due to comprehensive specialization in every field of construction.

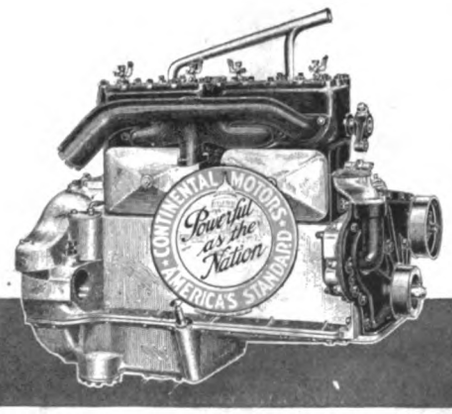
The SPECIALIZED truck is recognized as standard

Just as the building progress of the last decade has developed the cathedrals of commerce—the modern sky-scrapers—the automotive progress of the last twenty years has developed that triumph of transportation—the SPECIALIZED truck.

Just as the sky-scraper rises under the labors of scores of great specialist-organizations, the SPECIALIZED truck is the result of the co-ordinated efforts of truck builders and the leading manufacturers of specialized units—motor, transmission, universal joints, axles, clutch, etc.—all proven units.

You can sell SPECIALIZED trucks on the strength of your reputation and the added reputations of the unit manufacturers; on their standing with the truck-buying public and on parts-distributing stations throughout the world assuring uninterrupted performance.

See that your truck is a SPECIALIZED truck and that upon the crankcase of the *motor* appears the sure sign of motor specialization—the Continental Red Seal.



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Offices: Detroit, U. S. A. *Factories: Detroit and Muskegon*

Largest Exclusive Motor Manufacturers in the World

Continental Motors

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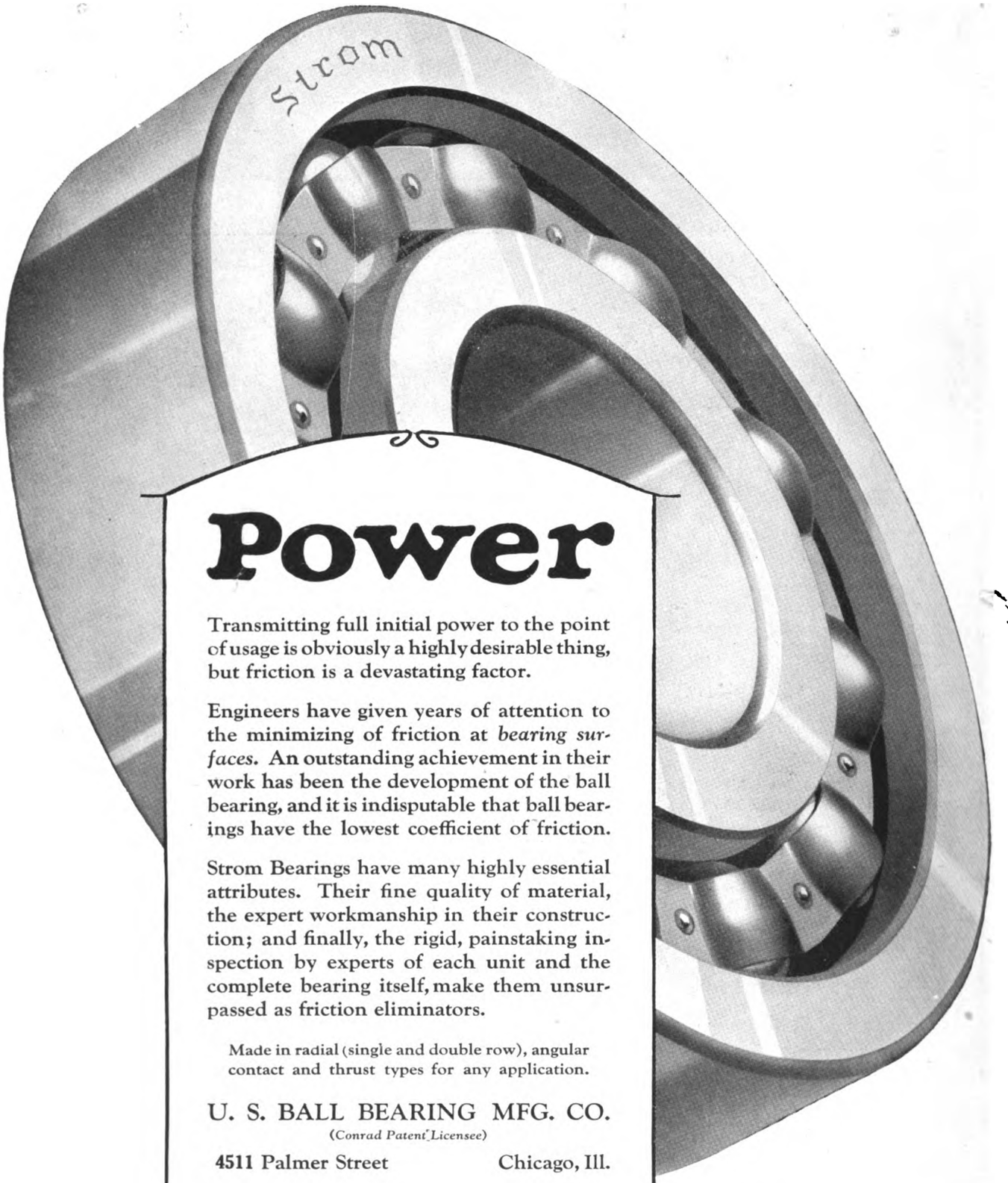

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Transmitting full initial power to the point of usage is obviously a highly desirable thing, but friction is a devastating factor.

Engineers have given years of attention to the minimizing of friction at *bearing surfaces.* An outstanding achievement in their work has been the development of the ball bearing, and it is indisputable that ball bearings have the lowest coefficient of friction.

Strom Bearings have many highly essential attributes. Their fine quality of material, the expert workmanship in their construction; and finally, the rigid, painstaking inspection by experts of each unit and the complete bearing itself, make them unsurpassed as friction eliminators.

Made in radial (single and double row), angular contact and thrust types for any application.

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(*Conrad Patent Licensee*)

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Strom BEARINGS

"Wherever a Shaft Turns"

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General Motors Trucks

There is a message for every motor truck dealer in the fact that many of the largest motor truck users such as Standard Oil, Morris & Company, Armour & Company and national merchants of the same character are big buyers of GMC trucks.

It is an indorsement of the quality and performance of GMC trucks such as could be obtained in no other way than by the actual sale of these trucks to firms having every facility for selecting the best motor truck.

To the retailer of motor trucks this should be proof of GMC quality and of the possibilities that a GMC franchise offers.

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Chassis Only—At the Factory—Tax to be Added

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544 Lake Shore Drive, Chicago, U. S. A.

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VOL. XXIX. NOVEMBER, 1922. No. 216.

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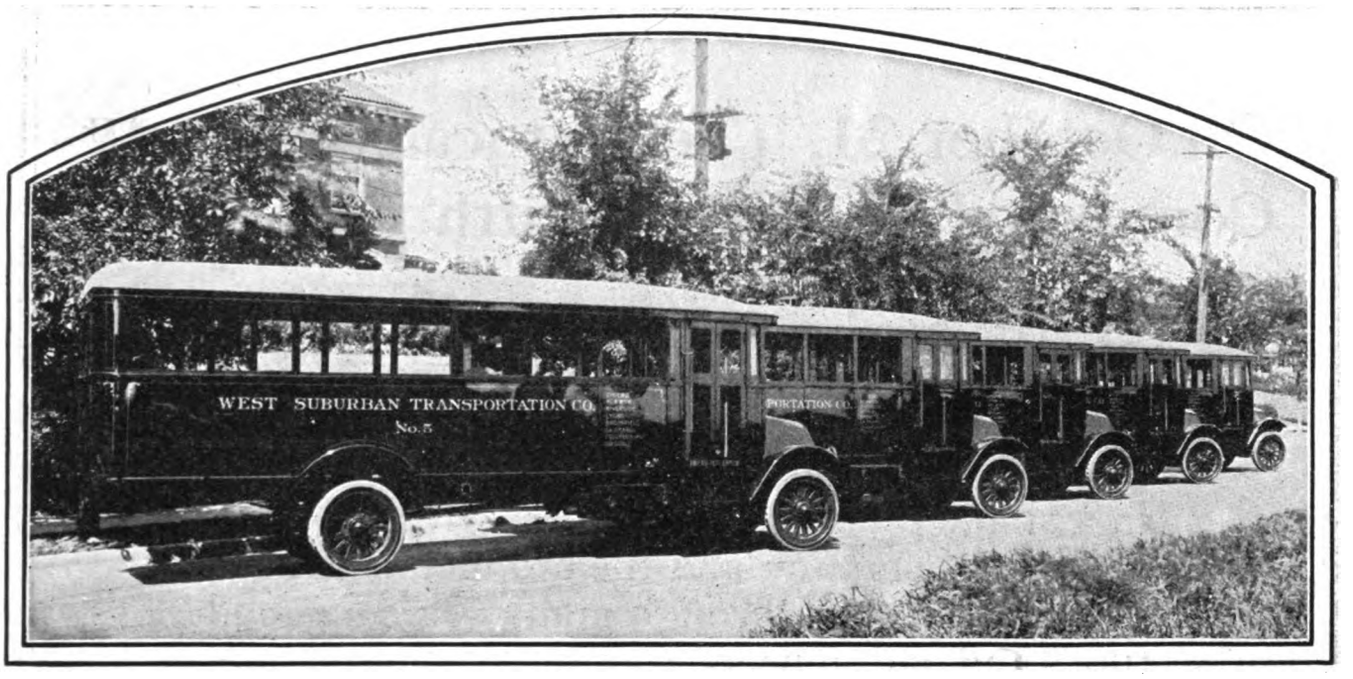

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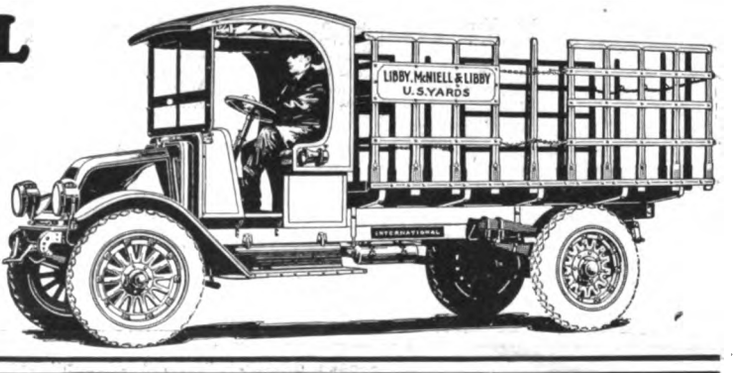
Model 31, 3,000-lbs.	Model 61, 6,000-lbs.
Model 41, 4,000-lbs.	Model 101, 10,000-lbs.



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On October 21, The Autocar Company Completed Its Twenty-fifth year

THE Autocar Company is one of the few surviving pioneers. It is concentrating all the accumulated experience and resources of 25 years of consistent manufacturing effort in a single product, the Autocar Motor Truck. Both the Company and the product have been tested in all ways through many years, in good times and bad, in peace, war and reconstruction.

Today, in addition to the Autocar manufacturing plant at Ardmore, Pa., there stretches from coast to coast the unusual Autocar Sales and Service Organization of Direct Factory Branches and Representatives, each a permanent center of expert, personal service, built and maintained by The Autocar Company to make immediately available to Autocar users the ideal of helpful, practical service on which the company was established.

Out of an experience which has covered every important development in automotive transportation, The Autocar Company and its product stand today in a well-earned place of approval in the public mind. This public confidence makes The Autocar Company keenly alive to the even greater accomplishment which the Nation will require of every important motor truck manufacturer during the next quarter-century.

Send for free copy of illustrated 25th anniversary book.

The Autocar Company, Ardmore, Pa. (Established 1897)

Direct Factory Branches

New York	Boston	Philadelphia	Pittsburgh	Chicago	San Francisco
Brooklyn	Providence	Camden	Buffalo	Cleveland	Sacramento
Bronx	Worcester	Chester	Baltimore	St. Louis	Oakland
Newark	New Haven	Allentown	Washington	Dallas	Stockton
Schenectady	Springfield	Wilmington	Richmond	Los Angeles	Fresno
Syracuse	New Bedford	Atlantic City	Atlanta	San Diego	San José
Fall River					

Autocar

Wherever there's a road

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POWER WAGON

Vol. XXIX. CHICAGO, NOVEMBER, 1922. No. 216.

Industry's Output Shrinks While Factories Increase

OUTPUT PER FACTORY DROPPED 40.2%

There was a considerable decrease in activities of automobile manufacturers last year, compared with 1919, according to the census report of the Department of Commerce. In 1921 368 establishments reported a total output valued at $1,666,140,189, compared with 1919 output by 315 concerns valued at $2,387,903,287. Production of completed automobiles last year totaled 1,585,395, valued at $1,320,175,169, and in 1919 1,868,310 machines valued at $1,722,626,704. These statistics relate to manufacturers whose chief products were complete automobiles, and do not include establishments engaged primarily in making bodies, parts and accessories.

Of the 368 establishments reported in 1921, 64 were located in Michigan, 50 in Ohio, 39 in Illinois, 30 in Pennsylvania, 28 in Indiana, 26 in New York, 25 in California, 19 in Wisconsin, 12 each in Massachusetts and Missouri, 8 in New Jersey, 6 each in Iowa and Texas, 5 each in Kentucky, Minnesota and Washington, 3 each in Connecticut, Georgia and Oklahoma, 2 each in Colorado, Nebraska, North Carolina, South Carolina and Virginia, and 1 each in Alabama, Arkansas, District of Columbia, Louisiana, Maryland, New Hampshire, Oregon, Tennessee and West Virginia.

Statistics for 1921 and 1919 are summarized in the following tabulation:

	1921.	1919.
Number of establishments	368	315
Persons engaged....	164,999	242,922
Proprietors and firm members...	35	36
Salaried employees	22,061	32,327
Wage earners (average number)..	142,903	210,559
Salary and wage payments	$278,912,691	$379,381 674
Salaries	57,972,175	67,215,804
Wages	220,940,516	312,165,870
Contract work.....	986,193	198,142
Cost of materials...	1,104 497,012	1,578,651,574
Value of products..	1,666.140,189	2,387,903,287

Second Inflation Due

The automotive industry, and all industry in general, is due for a short "secondary period of inflation," which will not be severe and which may not last long, according to the prediction of Alfred Reeves, general manager of the National Automobile Chamber of Commerce, following a two-day conference with government officials and members of the District Federal Reserve Board in Washington. This secondary period of inflation, however, in Mr. Reeves' opinion, will have little effect upon the automobile industry for three reasons:

First, because the automobile industry is going to profit from 'dammed up buying.' These 'dammed up buyers' are those who wanted to buy automobiles last year but did not do so, waiting for prices to come down.

"Second, because there is a more general use of automobiles in smaller cities, as actual necessities in the matter of transportation.

"Third, because of the inadequacy of the railroad facilities, and the recent strike which taught the general business public the advantage of automotive highway transportation."

September Motor Vehicle Output

Shipping figures announced at the National Automobile Chamber of Commerce members meeting indicated a production of 205,950 cars and trucks for September. This is nearly one-third better than September last year, though representing a seasonal decline from August.

Trade reports from the field indicate that October business will be good, though, as usual, it will be considerably under the summer months.

Monthly factory sales figures for the three quarters of 1921 and 1922 are:

	1921.	1922.
January	51,919	90,421
February	65,218	120,293
March	109,758	171,690
First quarter	226,895	382,164
April	156,892	219,294
May	163,667	255,167
June	177,757	289,120
Second quarter	498,316	763,581
July	176,067	244,355
August	178,831	272,094
September	157,404	**205,957
Third quarter	512,302	722,406

**N. A. C. C. September, 1922, estimated from traffic reports.

Truck Price Reductions

The following changes in truck chassis prices have been announced since the publication of the last similar list in these columns:

Model.	Old Price.	New Price.	Reduction.
Ford, 1-ton	$ 430.00	$ 380.00	$ 50.00
Stoughton, ¾-ton.	1,240.00	1.095.00	145.00
Twin City, 2-ton...	2,750.00	2,400.00	350.00
Twin City, 3½-ton.	3,950.00	3,500.00	450.00

Chicago Has 33,774 Trucks

Chicago's city license collections for motor vehicles this year to October 14 aggregated $2,469,308, compared with last year's total of $2,101,325. There are now 170,021 passenger-cars against 137,755 last year and 33,774 commercial motor vehicles against 29,239 a year ago.

Ford Takes Another $50 from Truck Chassis Price

OTHERS NOT EXPECTED TO FOLLOW

Henry Ford has again startled the trade with the announcement of further price reductions, amounting to a flat $50 on all models, including the 1-ton truck chassis. This machine, formerly priced at $430, is now listed at $380. The announcement was as much a surprise to Ford dealers as to the trade at large, as no hint whatever of the contemplated move had been allowed to escape, and the amount of the reduction has occasioned considerable comment, since it is the largest Ford has made since the first one two years ago and is more than three times as great as that of last January, which amounted to but $15.

For this last reduction, for which all sorts of explanations are offered, no adequate reason is given, although it would appear that Ford is anxious to show his ability to widen still further the gap that exists between his product and that of those who may be considered his competitors. This account applies with greater reason to his passenger-cars than to the truck, since in the latter field he is not generally admitted to have any competition in the matter of price.

While the reduction is expected to have the same effect in the passenger-car field as have his previous reductions, notably that of September, 1920, other truck makers are not likely to be much moved by the change. The prices of the leading makes of trucks have been sharply marked down in the last two years and in many cases they represent values in excess of any ever offered before. In some instances prices are at pre-war levels in spite of advances in engineering as shown by the newer designs. Everything considered, leading manufacturers whose opinion has been sought, express the belief that there will be no further reductions in the prices of their machines until the costs of production and distribution can be appreciably lowered. They contend that the good motor truck of to-day returns a higher percentage of earning-dividends than any other commercial utility in use by the commercial world.

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Makers See Fair Treatment in New Tariff Provisions

RECIPROCAL RULINGS HELD ASSURED

Immediate action under the elastic powers accorded the president will be asked in furtherance of exports by representatives of the automobile industry, who are arranging for a conference with the Tariff Commission in Washington. The Manufacturers believe, once they are assured equality of treatment such as is possible of attainment under the export features of the tariff, that they will be enabled to retain their predominating share of the world's trade in motor vehicles.

The automobile duty, having been reduced to 25 per cent., affords a definite basis for uniformity in this regard in all countries that manufacture motor vehicles. France, seeing that our duty has been reduced on her vehicles, will undoubtedly reduce to that level her duty, which now amounts to 45 per cent, on American machines. Italy has been collecting 35 per cent. plus a duty based on weight ranging from 60 to 120 lira per 100 kilograms. Indications, however, have already been given that a lowering of the Italian duty may be expected once the United States takes the initial step. The duty in Belgium, being 20 per cent. but based on landed cost at destination rather than value at place of origin, already approximates the United States duty. In the United Kingdom only a slight reduction is needed to bring the duty of 33 1-3 per cent. now charged down to the rate provided in the United States tariff.

In our trade with colonies of other nations, the export features of the tariff should prove helpful. American exporters have been at considerable handicap in colonies of the United Kingdom, France and Italy because of preference accorded to the mother countries. This condition existed despite the fact that United States has been a better market for the products of these foreign colonies than in many instances the mother country. The British West Indies are typical illustrations. A large buyer of goods is accorded at less equality of treatment in domestic trades among merchants and no valid reason exists why a similar arrangement should not be applicable among nations or subdivisions of countries.

With this condition in view the president of the United States has been accorded powers to increase the duties by one-half on the products from any country, or subdivision thereof, that fails to accord fair treatment to American commerce. Under this provision the trade of the United States would be stimulated with countries favoring our exports rather than with these placing undue obstacles in their way. Jamaica, as an illustration, finds the United States an excellent market for its products. Nevertheless, duty on an American machine is 20 per cent., whereas only 15 per cent. is collected on one of British origin. Under the circumstances, if they were to continue, the president could increase duties on Jamaican products by one-half of the present rates. This action would have the tendency of diminishing our imports of these products from Jamica, but on the other hand increasing them from countries favorable to the United States and given over to cultivation of semi-tropical products also.

Discrimination, other than those resulting from colonial policies, also exist at the present time. Finland is allowing the French automotive exporter to pay a duty representing but one-fourth of what the American shipper is charged. A similar advantage has also been given to France by the Polish government, which is, in addition, considering an arrangement along the same line with Switzerland. Even in our neighboring country to the north the french and Belgians pay only 30 per cent., whereas the American exporter is assessed 35 per cent. on his automotive product. Negotiations once carried on by the president under the powers now accorded him will probably result in a more favorable treatment for American commerce with these countries.

Legislation, not necessarily pertaining to duties, may also be in force in a foreign country and adversely affect American commerce. Czecho-Slovakia has an embargo, but as a result of a commercial treaty exempts Italy from its application. The shut out of a promising market in favor of United States exporter is consequently a competitor. Germany is exporting automobiles, some of which come to this country. American shippers, however, are not accorded a similar privilege, because of the embargo on imports of motor vehicles. A demand, although limited, exists now. Americans could successfully compete at present, and more so as time went on, if means to do so were accorded by the removal of the embargo.

Various kinds of regulations have proved adverse to our trade. Restrictions on the radius of automobiles, although having no significant bearing on traffic safety, has been used to bar American vehicles. Fortunately the export features of the United States tariff are sufficiently comprehensive to make necessary negotiations possible and bring about satisfactory adjustments.

The delegation, representing the National Automobile Chamber of Commerce, to present request to Tariff Commission, will comprise among others, J. Walter Drake, chairman of the Foreign Trade Committee, and G. F. Bauer, secretary of this committee.

'Buses Must Use Pneumatics

According to F. C. Biggs, minister of highways of Ontario Province, Canada, all motor 'buses will be required in the near future to use pneumatic tire equipment. The decision has been made on the grounds that passenger-carrying vehicles should provide the greatest comfort for their occupants and that, on account of their high speed and heavy loads, they should be fitted in a manner that will cause the minimum of highway damage. The government was advised to require that all commercial motor vehicles be fitted with pneumatics but this is not considered practicable.

Railway Men Will Not Seek 'Bus Curbing Laws

ACCEPT COMMITTEE REPORT, THOUGH

During the past year the American Electric Railway Association has had a committee working on the draft of a uniform motor vehicle bill which, it was thought, would be desirable to introduce in the various legislatures of the country. The draft of this bill, which was reported by the committee did not meet with favor because of one clause covering the taxation on motor 'buses and trucks. The plan of the bill was to tax trucks and 'buses on a ton-mile basis, one rate for vehicles with pneumatic tires, and a rate 50 per cent. higher for vehicles with hard rubber tires. The committee recommended the following rates of taxation:

"Motor vehicles having pneumatic tires—1 cent per ton-mile of travel over and along the public highways.

"Motor vehicles having hard rubber or solid tires—1.5 cent per ton-mile of travel over and along the public highways.

"In figuring the ton-miles of passenger travel the maximum seating capacity of each passenger-carrying motor vehicles unit (trailers to be included) at 150 pounds per passenger seat, plus the weight of the vehicle, multiplied by the number of miles operated, all divided by 2,000, shall determine the ton-miles of passenger travel per month.

"In figuring the ton-miles of freight travel, the maximum freight-carrying capacity of each freight-carrying truck or vehicle unit (trailers to be included), plus the weight of the vehicle, multiplied by the number of miles operated, all divided by 2,000, shall determine the ton-miles of freight travel per month."

The bill was merely approved by the convention as a report and no specific attempt to secure any such legislation was recommended by the convention.

Parts at National Show

M. L. Heminway, general manager, has given the Motor & Accessory Manufacturers' Association, has given out a list of the affiliated concerns who will exhibit at the New York and Chicago National Automobile Shows, 1923. One hundred and twenty-five representative manufacturers of units and equipment are on the list of exhibitors; of these 82 will exhibit in both shows; 34 in New York only, and 9 in Chicago only. The New York Show will be held at the Grand Central Palace January 6 to 13, 1923, and the Chicago Show at the Coliseum January 27 to February 3, 1923.

Several important manufacturers who have not taken space at the shows for a number of years are now listed among the exhibitors. This trend indicates the value which accessory and unit manufacturers attach to the national automobile weeks in both New York and Chicago.

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Autocar Company Passes the Quarter-Century Mark

BUSINESS STILL IN FOUNDERS' HANDS

The Autocar Company of Ardmore, Pennsylvania, manufacturer of the Autocar motor truck, completed its twenty-fifth year on October 21. The company is one of the few surviving pioneers. Both the company and its product have been tested in all ways through many years, in good times and bad, in peace, war and reconstruction.

Louis S. Clarke, founder of the Autocar Company, and at present one of its vice-presidents, first became interested in motor vehicles in Pittsburgh in September 1890. His attention was first centered on an electric vehicle but about 1895 he turned toward the gasolene engine. In 1897 he combined his interests with those of William Morgan, who had been carrying on similar experimental work in Pittsburgh, and that combination of interests marked the real beginning of the Autocar Company. The company was incorporated under its present name in 1899 and early in the next year moved from Pittsburgh to the present location in Ardmore.

When the Automobile Club of America organized the first endurance run from New York to Buffalo in 1901. The Autocar Company entered two of its Type VI cars. As soon as Mr. Clarke returned to Ardmore, he started designing a shaft-driven car which, only two and one-half months later, was completed and driven by him to the Automobile Show in New York. That was the first shaft-driven car built in America and the first of its kind ever exhibited here. It created great comment.

Work on Autocar trucks was begun seriously in 1907. The first truck was sold in 1908 and remained continuously in service for three years until it was traded by its owner for a type 21UF. The type 21UF is still in production at the Autocar plant. It and the type 21UG are both equipped with the Autocar 2-cylinder motor. Four different 4-cylinder models, ranging from 2 to 6 tons capacities, now complete the Autocar line.

The Autocar Company now manufactures motor trucks exclusively and all Autocar trucks are characterized by the distinctive principles which Louis S. Clarke has from the first considered essential, that is, the placing of the engine under the seat so as to provide a short wheelbase, small turning radius and evenly balanced load.

The Smithsonian Institution in Washington, D. C., recently selected the 4-cylinder Autocar trucks for permanent exhibition in the Transportation Section. Two small size, working models of 4-cylinder Autocars were made by the Autocar Company and presented to the Smithsonian Institution where they are now on exhibition and the card which the Institution has attached to one of them reads: "Automobile truck 1921, illustrating the latest development of transportation."

In addition to its manufacturing headquarters at Ardmore, the Autocar Company now maintains and operates 36 direct factory branches covering the entire country. The Autocar branch at Newark, New Jersey, operates a reconditioning and warehousing department which has in active use a floor space of more than 77,000 square feet and which is necessary to take care of the requirements of Autocar users in the New York metropolitan area. Each of the Autocar branches is a permanent center of expert, personal service, built and maintained by the Autocar Company to make immediately available to Autocar users helpful, practical service.

From the very beginning the Autocar Company has continued to manufacture its own product and has participated in the development of many of the important details by which the present efficiency of automotive transportation has been promoted and achieved. Today the principal stockholders of the Autocar Company are the same individuals who started the business and fully 90 per cent. of the common stockholders are employees of the company.

GMC Truck Sales Good

Sales of trucks are continuing in encouraging numbers, according to W. L. Day, president and general manager of the General Motors Truck Company, although the volume of business is not quite as large at present as earlier indications had led the manufacturers to expect. The plant has had no shut-down and anticipates a steady run through the fall and winter, if sales continue at the present volume. Retail sales throughout the country are holding up well, the weekly reports of the plant show.

"The motor truck industry is feeling the effect, to some extent, of the uncertainty existing in the minds of many people because of the tense industrial situation this summer," Mr. Day declares. "The coal and rail strikes have unsettled things in general so that the sales field which was opened up by the improved general conditions was agitated considerably. It is necessary to overcome this situation and restore confidence fully before the maximum business can be obtained. However, we are going along at a very nice pace."

Chicago Motor 'Bus Company

The recently reorganized Chicago Motor 'Bus Company will have a capitalization of $3,000,000 and will operate coaches over more than 70 miles of Chicago streets at a 10-cent fare. The present equipment of the old company will be utilized until 300 new 'buses contemplated are ready.

Associated with John A. Ritchie as president will be John Hertz, president of the Yellow Cab Company, of Chicago; Charles McCullough, William Wrigley, Jr., and members of the Swift and Armour families.

Station Wagon a Passenger Car

Any indecision as to the classification of the "suburban" or station wagon has been set at rest by a decision handed down by the Appellate Division, New York. This holds that this popular type of vehicle is a "passenger car" and as such is entitled to the lower license rate collected by the automobile bureau.

Exclusive Truck Dealers Are Ideal, Says Coppock

EXPECTS GOOD TRUCK SALES IN 1923

"Sales of trucks, aside from those in light delivery service and for 'bus work, have been disappointing to those who looked for a late summer and fall boom," says O. D. Coppock, sales manager of the Commerce Motor Car Company of Detroit, "and as a result, the best the truck maker can anticipate with any surety is that a revival in general business in the spring will bring about a renewed need for trucks and new demand.

"There has been fair business all year throughout the East and in the industrial sections of the Middle West, and this market should continue to absorb a sufficient number of trucks to keep factories operating on a basis that will permit them to break better than even. Investigations in the farm districts indicate that the farmer will not do much better than clear up his old debts as a result of this year's crop. His buying of trucks will not do much more than absorb the stocks which have been hanging over in dealers' salesrooms and in storage for the past two years. With these cleared out the truck makers should be able to re-enter this market on a sizable scale in 1923.

"Truck dealers as a general rule have become quite discouraged in the past two years and for the most part have given over their entire attention to the sale of cars. Until general business have begun to come into the market, dealers will be slow to stock up on trucks. The absence of stocks will present a problem which the factory must anticipate as truck buyers are insistent upon immediate deliveries. Dealers in larger cities who are handling trucks exclusively are doing practically all the business at this time. Dealers handling cars and trucks together, as is the case in most cities of the country, are following the lines of least resistance and giving practically all of their attention to car sales. It is difficult to combat this situation until dealers find themselves warranted in placing men exclusively in truck sales work.

"The ideal merchandising plan for the truck maker is to have an exclusive dealer and next to this a dealer who is handling several lines of trucks exclusively. Except in the larger cities, however, the exclusive truck dealer has not been successful and it has been necessary to combine the sale of the commercial motor vehicle with passenger-car trading. Undoubtedly this system of merchandising will continue to be the general one and in normal times should be entirely successful from the factory viewpoint.

"There is every reason to look forward to a good truck business in 1923, but it will not be an overnight development, and will only develop as general business throughout the country resumes its normal stride. The truck business has never approximated its possibilities and, unlike the passenger-car end, its period of greatest growth is still before it."

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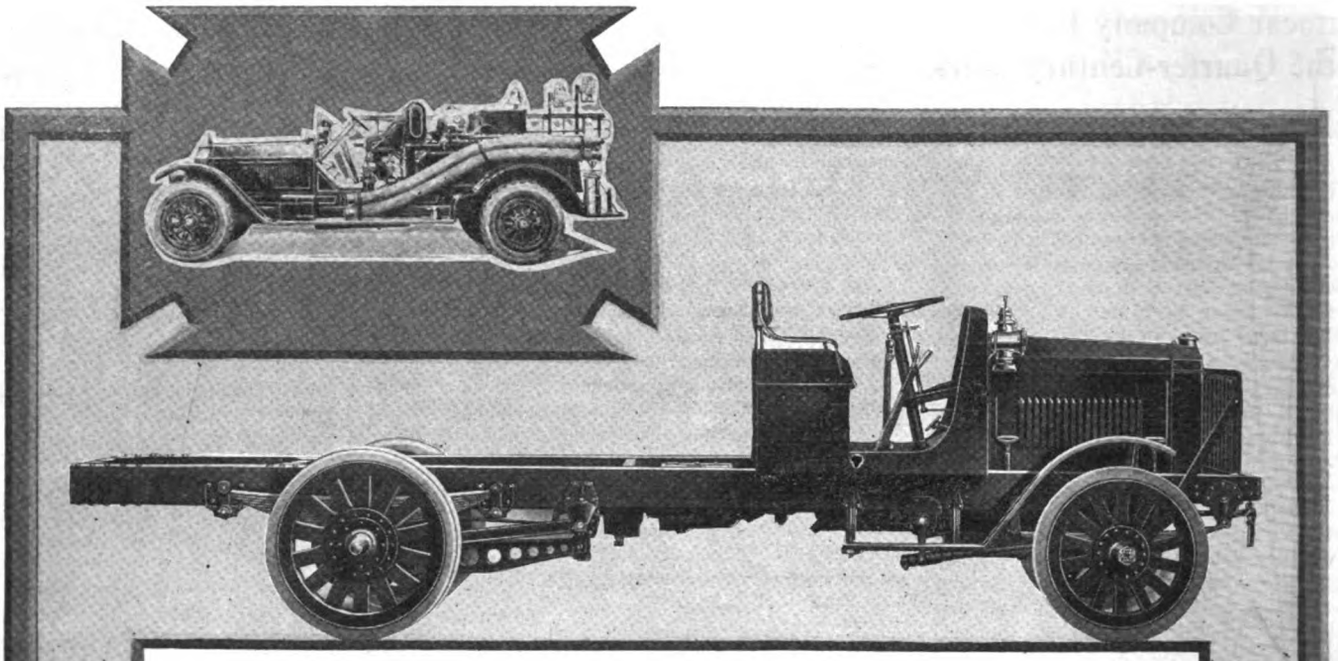

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Back of American-LaFrance Commercial Trucks is the same skilled engineering organization, the same manufacturing equipment, and the same policy of producing automotive products that will be unsurpassed for strength and stamina.

American-LaFrance Commercial Trucks will be well worthy to bear the name.

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FACTORY BLOOMFIELD, N. J. ELMIRA, N. Y. *NEW YORK OFFICE* 250 WEST 57th ST.

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

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Results of Overcrowding

IF ANY further evidence were needed to convince the most skeptical of the folly and high industrial cost of unnecessary duplication of manufacturing facilities, the truck production records of the last few years can easily supply it. And the Department of Commerce, in statistics that deal with the automotive industry as a whole, has furnished yet more corroborative data.

In 1919, the year of more than plenty, 148 truck makers (excluding one whose product is generally conceded to be in a class by itself) produced 216,364 motor trucks (accepting the figures issued by the National Automobile Chamber of Commerce) and these had a wholesale value of $385,336,621, an average of 1,461 trucks and $2,603,625 worth of product per factory. In 1921, the year of general collapse, 234 truck makers produced 94,550 trucks of a wholesale value of $139,562,000, an average of 404 trucks and $596,391 worth of product for each factory. While the loss in business for the entire industry was $245,774,621 in value of product, a decline of 63 per cent., the loss per factory averaged $2,007,234, a reduction of 77 per cent. That is to say, by increasing the number of producers by 86, or 58 per cent., the opportunities of the average factory among those in existence in 1919 were reduced by a full 14 per cent. in 1921. Had there been no such increase in the number of producers, the average output per factory would have been $942,986, or $346,595 more than it actually was, the difference being enough in many cases to have wiped out the producer's loss, assuming that the benefits, like the burdens, could have been evenly distributed. The expansion in producing factors made business at least 36 per cent. worse for the established concerns than it need have been had the inflation not taken place.

The government's figures for the entire automotive industry disclose a similar situation and one that could only be expected, seeing that the overcrowding from which the truck industry suffers prevails, though in a smaller degree, in all branches of the motor trades. These data show that in 1919 there were 315 concerns who produced automotive equipment (including complete vehicles) worth $2,387,903,287, an average of $7,580,645 worth of product per factory. In 1921 there were 368 firms which made but $1,666,140,189 worth of product, an average of $4,527,554 per factory. The loss for the entire industry was $721,763,098 in value of product, or 30.2 per cent., and the loss per factory averaged $3,053,091, a reduction of 40.2 per cent. That is to say, by increasing the number of producers by 53, or more than 16 per cent., the opportunities of the average factory among those in existence in 1919 were reduced by 10 per cent. in 1921. Had the expansion not taken place the average output per factory would have been $5,289,337, or $761,783 more than it actually was, and the business of the established concerns would have been nearly 15 per cent. better than it was.

These statistics disclose a deplorable condition. The advent of 86 newcomers in the truck industry between 1919 and 1921 caused a loss of business to the established concerns of more than 36 per cent., a depression more than twice as great as that experienced by the automotive industry as a whole. It is strikingly apparent that the truck industry, for some reason, has exercised a greater attraction for the commercial adventurer than any other branch of the automotive trade group, and that the results have been well-nigh disastrous. What has been the experience in times of stress will be repeated in times of prosperity, although the burdens will not be so conspicuous. The greater the number of contestants for the motor truck business of the country, the smaller must, of necessity, be the share obtained by each. It remains to be seen whether the industry will continue indifferent to the growth of a menace that threatens eventual disintegration.

The Enemies of 'Buses

THE heretofore widely scattered opposition to the development of motor 'bus enterprise is fast becoming centralized and the lack of coördination that has characterized it in the past is giving way to a greater unanimity of thought and expression on the part of those who view the new form of transportation with alarm. It is highly desirable that the identity and methods of the 'bus's enemies should become known that their plans may be analyzed and their propaganda combatted.

The recent application of the Chicago Motor 'Bus Company for a franchise to operate 'buses on Chicago's south side has served to bring the enemies of better city transportation to the front. The existing rail transportation lines, organized labor, and the automobile club disclose themselves as the opponents of railless passenger service. The street-car and elevated railway companies naturally overlook no opportunity to stifle threatening competition, the labor unions see in the motor 'bus field little chance for organization and great opportunity for potential injury to the interests of the union employees of the closed-shop public utilities, while the automobile club seeks to bar the motor 'bus from the boulevards because of the alleged inconvenience it causes the private motor-car owner.

In every case the selfish interests of powerful groups stand opposed to the interests of the public seeking to obtain improved traveling facilities, while the great mass of people have no voice except through the occasional utterances of the newspapers. And that these, in spite of their adoption of the utility-baiter's attitude, are not whole-hearted in their apparent support of the 'bus idea is well indicated by the recent declaration of the *Chicago Tribune* in commenting on the situation described. While utilizing the 'bus plea as a means of further embarrassing the utilities, that paper deemed it necessary to qualify its advocacy of motor transportation by suggesting that the franchise to be granted should prohibit the carrying of standing passengers. Why

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this restriction should be applied to 'buses and not to other forms of passenger carriers is difficult to explain on logical grounds, and can only be accounted for by recognizing that such a limitation would seriously handicap the 'bus in its competition with the rail lines and is, therefore, in reality but a poorly disguised gesture on behalf of the existing facilities.

"The columns of the newspapers are open to the electric railway people," says the official organ of the street-railway interests, and they must demonstrate that the "railways are cheaper, safer and quicker in handling the people." If an organized campaign of railway advertising makes its appearance in the newspapers, the latter may then be expected to place themselves definitely in the ranks of the opposition.

Discarded for Cause

G. P. HAWKES, of the army's quartermaster corps, recently observed, in discussing the application and operation of motor trucks, that "95 per cent. of the automotive vehicles in the commercial world are relegated to the scrap heap before the public has obtained 50 per cent. of their value." While we may feel inclined to quarrel with the high percentage he has assigned to this needless waste of transportation potentiality, we can not but agree that the waste occasioned through premature discarding of used motor trucks is very large, indeed much larger than reason or sound economics can justify. The reason, as Major Hawkes alleges out of his army experience, is the lack of repair facilities and the dearth of trained men fitted to rejuvenate decrepit machines, but in the business world another and more powerful reason, we suspect, exists.

A great many of the motor trucks that have been discarded before their full work output has been taken from them have found their way to the scrap heap for the reason that their maintenance in efficient working order has been a very serious problem, and the great bulk of these, we firmly believe, have been made either by firms no longer in business or by those whose existence is most precarious and whose permanence is most open to question. The product of well-established manufacturers—those of long experience and serious intentions—seldom finds its way to the junk pile until the major portion of its usefulness has been yielded up to the owner's advantage, the reasons being that the makers' financial strength and business traditions insure adequate and widespread service facilities and that their pride in their work and their plans for the future guarantee a lasting interest in the buyer's satisfaction.

Weak manufacturers acquire weak distributing systems and the latter disintegrate more rapidly than the factories they represent. As the dealers fall gradually away, whatever product they have sold becomes orphaned in the hands of its users through the withdrawal of service facilities, and when the hour for parts renewal arrives it becomes easier to buy new product on a "trade-in" basis than to bring the old back to par. This has been the history of the product of every unstable truck manufacturer and, but for the elaborate service arrangements being provided at great cost by the leading parts makers, would always continue to be the prospect confronting every patron of impermanent makers and their dealers. Although this arrangement improves somewhat the buyer's problem, the risks of irregular manufacture continue as great as ever and, with the growth of commercial astuteness on the part of the purchasing group, these risks are bound to increase rather than diminish. And with the chances of unreliable manufacture becoming less the interest of buyers in the product may be expected to decline. With the growth of this attitude the percentage of utility obtained from the motor truck must necessarily increase as buyers become more and more insistent on dealing with the most reputable members of the manufacturing and distributing groups.

Remove the Load

CONGRESS has adjourned and the automotive industry will be left to the tender care of the tax-collectors at least until that august body reconvenes in the winter. Meanwhile, as for some time past, the foibles of the age bask care-free in the sunshine of unrestricted development—hair dyes, toilet waters, perfumes, patent medicines, chewing gum, toilet soaps and other wholly non-essential products. The taxes on these luxuries and that on railroad transportation have been lifted through the strained reasoning or selfish interest (who shall say which?) of lawmakers paid to safeguard the public's welfare, while buyers of motor trucks, tires, parts and accessories are still forced to pay the 3 per cent. tax levied on such equipment during the war in 1918. If the rate of taxation is to be taken as a safe guide to the relative essentiality of various commodities, the articles named—together with fur coats, musical instruments, sporting goods, "thermos" bottles, ice cream, picture frames and cinematograph films—are deemed of greater national importance than motor transportation, which saved the country's industries from paralysis during the war and immediately after and now offers to the inadequate railways greater aid than any other carriage medium. If Congress have but half an eye to the interests of the nation, it will repeal without further delay the absurd and unjust levies that now burden and restrict, not only the motor truck industry, but every form of business that relies to any extent on highway transporattion.

Motor Competition Brings 'Buses

The Chicago, Ottawa & Peoria electric railway, which has been suffering through the competition of motor 'bus lines that parallel the road of the traction company, has been forced, in the interest of self protection, to operate motor 'buses also, and has applied to the Illinois Commerce Commission for a certificate of convenience and necessity. It is proposed to operate a fleet of 'buses between its station at Utica and Starved Rock park; between its stations in Peru and La Salle, to Starved Rock park; between its stations in Peru and La Salle and Deer Park and Oglesby; and also between its station at Spring Valley and the village of Ladd. Regular schedules are planned in order to afford perfect connection and promote convenience of the public.

Tire Exports Improve

The tire export situation is more satisfactory than for years, according to authorities. Exports are better than expected three months ago when a slight recession in business was noted. It was believed this might be the beginning of a gradual decline of American tire business in foreign countries. This decline lasted only a few weeks, however, and then volume increased and has continued to.

French competition is becoming keen. This is a development of the past six months, and has aided business rather than hindered it. German manufacturers have not taken a great part in the export field. Companies which formerly took little interest in export of tires have gone into it seriously.

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September Truck Output Falls

Figures received by the Department of commerce through the Bureau of the Census show a marked seasonal decrease in the production of both passenger cars and trucks in September. The total production of passenger cars in September was 186,562, compared with 249,225 in August, while truck production in September amounted to only 18,843, as against 24,200 in August. The September production is the lowest since last March, but is considerably above the figures of September, 1921, when the total production was reported as 144,669 passenger-cars and 13,648 trucks.

The following table gives the total production for each of the last nine months. With a few exceptions, the reports each month are from identical firms and include approximately 90 passenger-car and 80 truck manufacturers. September figures are subject to slight revision when all reports have been received.

1922—	Passenger cars.	Trucks.
January	81,693	9,416
February	109,171	13,195
March	152,959	19,761
April	197,216	22,342
May	232,431	23,788
June	263,027	25,984
July	224,057	21,357
August	*249,225	*24,200
September	186,562	18,843

*Revised.

New N. A. C. C. Committees

Many leading automobile executives have been named by Charles Clifton, president of the National Automobile Chamber of Commerce, to serve the industry during the coming year. These men will devote their time to such subjects as highway development, taxation, better advertising and other topics related to motor transport. The roster for 1922-23 is as follows:

MOTOR TRUCK COMMITTEE.
Windsor T. White (White), chairman.
E. A. Williams, Jr. (Garford).
M. L. Pulcher (Federal).
R. H. Salmons (Selden).
D. C. Fenner (Mack).
David S Ludlum (Autocar).
Robert O. Patten (Pierce-Arrow).
Ray E. Chamberlain (Packard).
F. E. Smith (Republic).
F. W. Fenn (N. A. C. C.), secretary.

TRUCK STANDARDS COMMITTEE.
D. C. Fenner (Mack), chairman.
F. A. Whitten (GMC).
E. M. Sternberg (Sterling).
A. Morehouse (Packard).
H. E. Derr (International).
F. W. Fenn (N. A. C. C.), secretary.

MOTOR FUELS COMMITTEE.
John N. Willys (Willys-Overland), chairman
Wm. Robert Wilson (Maxwell).
C. W. Nash (Nash).
S. E. Ackerman (Franklin).
Percy Owen (Liberty).
Mole Cook (Service).
C. F. Kettering (Buick).
S. A. Miles (N. A. C. C.).

SERVICE COMMITTEE.
F. J. Wells (Pierce-Arrow), chairman.
L. C. Voyles (Marmon).
A. B. Cumner (Autocar).
F. A. Bonham (Durant).
W. M. Warner (Cadillac).
H. R. Cobleigh (N. A. C. C.), secretary.

TRAFFIC COMMITTEE.
Wm. E. Metzger (Columbia), chairman
A. T. Waterfall (Dodge Brothers).
F. C. Chandler (Chandler).
Geo. M. Dickson (National).
W. L. Day (GMC).
J. S. Marvin (N. A. C. C.), manager.

EDUCATIONAL DEPARTMENT.
John C. Long (N. A. C. C.), secretary.

TAXATION COMMITTEE.
C. C. Hanch (Lexington), chairman.
H. H. Rice (Cadillac).
J. Walter Drake (Hupp).
Geo. M. Graham (Chandler).
Fred J. Haynes (Dodge Brothers).
Pyke Johnson (N. A. C. C.), secretary.

INSURANCE COMMITTEE.
Wm. E. Metzger (Columbia), chairman
Milton Tibbetts (Packard).
Stewart McDonald (Moon).
E. E. Staub (Hudson).
R. C. Rueschaw (Reo).
Livingston Short (Buick).
J. S. Marvin (N. A. C. C.), secretary.

FOREIGN TRADE COMMITTEE.
J. Walter Drake (Hupp), chairman.
H. M. Robins (Dodge Brothers).
R. C. Rathbun (White).
H. B. Phipps (Hudson).
J. D. Mooney (General Motors Export).
Howard S. Welch (Studebaker).
Geo. F. Bauer (N. A. C. C.), secretary.

HIGHWAYS COMMITTEE.
R. D. Chapin (Hudson), chairman.
Geo. M. Graham (Chandler).
Wm. E. Metzger (Columbia).
E. S. Jordan (Jordan).
A. J. Brosseau (Mack).
Pyke Johnson (N. A. C. C.), secretary.

LEGISLATIVE COMMITTEE.
H. H. Rice (Cadillac), chairman.
D. C. Fenner (Mack).
J. I. Farley (Auburn).
H. P. Doolittle (International Harvester).
David S. Ludlum (Autocar).
Harry Meixell (N. A. C. C.), secretary.

ADVERTISING COMMITTEE.
Edward S. Jordan (Jordan), chairman.
W. K. Towers (Paige-Detroit).
L. B. Dudley (Federal).
G. V. Radoye (Haynes).
A. B. Batterson (Buick).
Wm. E. Betts (Studebaker).
Geo. H. Phelps (Dodge Brothers).
John C. Long (N. A. C. C.), secretary.

PATENTS COMMITTEE.
C. C. Hanch (Lexington), chairman.
A. J. Brosseau (Mack).
James McAvoy (Chevrolet).
Wm. MacGlashan (Studebaker).
H. M. Jewett (Paige).
R. A. Brannigan (N. A. C. C.), manager.

HAND BOOK COMMITTEE.
E. T. Strong (Buick), chairman.
R. C. Rueschaw (Reo).
Geo. A. Kissel (Kissel).
A. L. Curtis (N. A. C. C.), secretary.

PASSENGAR-CAR SHOW COMMITTEE.
H. M. Jewett (Paige), chairman.
F. C. Chandler (Chandler).
J. Walter Drake (Hupp).
S. A. Miles (N. A. C. C.), show manager.

PASSENGER-CAR STANDARDS COMMITTEE.
N. E. Wahlberg (Nash), chairman.
H. T. Thomas (Reo)
Geo. P. Allen (Liberty).

NATIONAL COUNCILLORS TO CHAMBER OF COMMERCE OF U. S. A.
A. J. Brosseau (Mack).
Alfred H. Swayne (GMC).

REPRESENTATIVES OF NATIONAL INDUSTRIAL CONFERENCE BOARD.
A. J. Brosseau (Mack).
Alfred H. Swayne (GMC).

REPRESENTATIVE ON HIGHWAY EDUCATION BOARD.
Roy D Chapin (Hudson).

Motor Carrier Here to Stay

The motor vehicle as a common carrier is recognized in an opinion handed down by Charles G. Blakeslee of the New York Public Service Commission, who passed on the application for the operation of a 'bus line between Norwich and Syracuse. Mr. Blakeslee favors the granting of the application and asserts that the motor vehicle as a common carrier is here to stay.

Erie Truck in Receivership

The Erie Motor Truck Company, of Erie, Pennsylvania, has been thrown into a receiver's hands through the action of an Erie bank and other creditors. W. J. Stern has been appointed temporary receiver.

Federal Truck Convention

Featured by speeches predicting the rapid growth of the motor truck as a means of transportation within the next five years, a dinner at the Detroit Athletic Club and an excursion to Muskegon, Michigan, the annual convention of the distributers of the Federal Motor Truck company of Detroit, closed October 21. More than 75 distributers from all sections of the country attended the meeting.

The meeting opened on October 16, the day being given over to talks by C. L. Wood, chief engineer, on Federal trucks. On Tuesday Mr. Wood and W. L. Pulcher, vice-president and general manager, were the speakers. Mr. Pulcher predicted that within the next five years the truck industry would see the most prosperous era in its history. He went on to state that in his opinion the truck manufacturers, distributers and dealers who were still left in the business after the trying depression of 1921, were about to "cash in" on not only their tremendous investment but on their efforts to build up a paying industry and at the same time to benefit the country's sadly disorganized transportation system.

On Wednesday F. L. Pierce, general sales manager, addressed the distributers and told them of the organization of the sales force. He called to their attention the fact that the Federal company's sales force was one of the largest in the automotive industry, that in addition to the distributers present the company had about 600 dealers in the field and the organization extended even to foreign countries.

L. B. Dudley, advertising manager, also spoke on the advertising program and R. H. Crooker, sales promotion manager, spoke on the plans of his department for the next year.

On Thursday Mr. Pulcher spoke again on "Some Pertinent Questions to Distributers" and during the afternoon he spoke on "What Is Expected of the Federal Distributing Organization in 1923."

Throughout the entire convention a portion of each day was set aside for discussion and the distributers gave the factory executives their ideas on the truck situation.

With the close of the convention sessions Thursday the delegates adjourned to the Detroit Athletic Club, where a dinner was given by the company. Among the speakers at the dinner was F. W. Fenn, chairman of the motor truck committee of the National Automobile Chamber of Commerce. At the end of the dinner the delegates boarded a special train for Muskegon and spent Friday inspecting the plant of the Continental Motor company there.

Fay 'Bus Line Burned Out

A spectacular fire which broke out in the garage of the Fay Motor Bus Company of Rockford, Illinois, destroyed the building and contents with a total loss of $60,000, as estimated by the fire department. No insurance was carried by the company. The loss was complete with the exception of one 'bus which plies between Rockford and Oregon in Ogle County. Thirty-two 'buses were destroyed.

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Benzol Proves Ten Per Cent. Cheaper Than Gasolene

By W. O. HINCKLEY

Superintendent of Transportation, Peoples Gas Light & Coke Company, Chicago

THE respective merits of gasolene and benzol as internal combustion engine fuels have caused many a discussion in the automotive world and, for this reason, I will give a short history of benzol that is taken from actual occurrences in Chicago. When benzol in its crude state was first introduced there, the large oil companies tried hard to annihilate it, because it is the only fuel that has the market name of being a competitor of gasolene. Due to this fact the oil companies came out with various derogatory phrases that, at the time, were justified in some degree and in some instances are logical to-day. A few years ago several companies were making benzol for the internal-combustion engine and were successful until the cold weather set in; then the benzol froze in the gasolene tanks on the street. Many incidents of this kind and troubles with sulphur and acids left a doubt in the public mind about the value of benzol as an engine fuel. Experiments continued and, due to research, benzol was introduced as a stable fuel on the market. Were it not for the limited supply, benzol would, in my estimation, replace gasolene as a motor fuel within a short time.

The question is often asked: What is benzol and where does it come from? It is derived from coal carbonized in a by-product or recovery oven. There are four principal resultant products; ammonia, gas, tar and coke. While small quantities of benzol are recoverable from the light oil of coal tar, almost all benzol recovered is from an oil obtained by scrubbing coke-oven gas.

TABLE I.—SPECIFICATION FOR WATER-WHITE BENZOL.[1]

	Temperature Deg. Fahr.	Deg. Cent.
Distillation:		
First drop	175	79.4
60 per cent.	212	100.0
90 per cent.	250	121.0
Dry	275	135.0

[1]Residue, none. It must be neutral, containing no solids and practically no foreign bodies except slight quantities of sulphur present as CS_2, or thiophenes to total approximately 0.25 per cent. Specific gravity at 15.5 deg. cent. (60 deg. fahr.) 0.878 or 29 deg. Baumé.

Briefly, this coke-oven light-oil is obtained by passing oven-gas through "scrubbers" against a counter current of heavy petroleum. The light oil removed in this way is separated from the scrubbing oil by distillation, and the quantity of oil obtained varies with the nature of the coal coked, ranging from 1½ to 4 gallons per ton of coal. The light oil is then refined by distillation in fractionating column stills, sulphuric-acid washing and subsequent neutralization with caustic soda, thus producing certain water-white distillates which, when properly refined, respectively create pure benzol, tuluol and xylol. Motor benzol therefore is a distillate conforming approximately to the specification given in Table I.

Motor benzol will pass the doctor test and the corrosion and gumming test for gasolene. The doctor test is supposed to show sulphur, and the corrosion and gumming test to show residues.

A comparison of motor benzol that meets the specification in Table I with commercial gasolenes produced to-day is interesting. The products of refiners vary over a wide range. A few years ago the standard end-point for gasolene, the temperature at which it is completely vaporized, was from 330 to 350 degrees fahrenheit; to-day it varies from 400 to 500 degrees fahrenheit and in some instances it is as high as 600 dgrees fahrenheit. A distillation test of a high-grade sample of motor gasolene is given in Table II, this test having been made recently. However, we are not getting very much of this grade of fuel in Chicago.

TABLE II.—HIGH-GRADE MOTOR-GASOLENE DISTILLATION-TEST.[2]

	Temperature Deg. Fahr.	Deg. Cent.
Distillation:		
First drop	135	57
20 per cent.	212	100
60 per cent.	288	142
90 per cent.	387	197
93½ per cent dry.	417	214

[2]Residue 0.2 per cent. Specific gravity at 15.5 deg. cent. (60 deg. fahr.) 0.732 or 62 deg. Baumé.

While the initial point for the gasolene sample in Table II was 135 degrees fahrenheit as compared with 175 degrees fahrenheit for the motor benzol in Table I, the gasolene shows only 20 per cent. distilled off at 212 degrees fahrenheit, the boiling point of water; whereas the motor benzol distills about 60 per cent. at 212 degrees fahrenheit. The end-point of the sample of gasolene was 417 degrees fahrenheit as compared with 275 degrees fahrenheit for the motor benzol. There was a residue of 0.2 per cent. with gasolene, but the motor benzol shows no residue in distillation.

The so-called end-point referred to is a very important indication of the efficiency of motor fuel. A high end-point indicates the presence of non-volatile constituents such as kerosene, which, if present in too great an amount, would reduce the efficiency of the motor fuel. Various methods are used in demonstrating this. A simple one is to compare the time of evaporation or volatilization of a fuel having a high end-point with one of a low end-point. This was done with the sample of gasolene referred to in comparison with a typical motor-benzol sample. This test was made by an arbitrary method; an equal amount, 5 cc., of each material was permitted to evaporate from an alberene stone dish, approximately of 4-inch internal diameter, under similar conditions. The evaporation time of benzol was about 26 minutes and of the typical motor gasolene 145 minutes. High test gasolene, such as is used in aviation, evaporates in about 11 minutes.

The heat value of motor benzol is about 18,700 B.t.u. per pound; whereas gasolene has about 17,460 B.t.u. per pound. Benzol is considerably heavier than gasoline, weighing about 7.3 pounds per gallon as against 6.5 pounds per gallon for gasolene. The heat value for motor benzol is therefore about 137,000 B.t.u. per gallon compared with 113,500 B.t.u. per gallon for gasolene.

The vapor-tension of motor benzol is high compared with that of gasolene and, therefore, benzol is quick-firing in spite of its greater weight. The boiling-point of a liquid is an indication of its vapor-tension; for, as a general rule, as the boiling-point goes up, the vapor-tension comes down. Motor benzol has an average boiling-point of about 190 to 194 degrees fahrenheit; gasolene will run about 256 degrees fahrenheit or better.

Table III gives comparative data submitted by C. S. Heath, a chemist who has grown up with the development of benzol in this section of the country, and is largely responsible for having solved the problem of preventing benzol from freezing.

During a recent test on a 4-cylinder engine rated at 35 horse-power, we were successful in developing 36 horse-power with motor benzol against 32¼ horse-power with gasolene at 1,900 revolutions per minute. A run of 6 hours at approximately 1,064 revolutions per minute was made with both fuels. The following results were determined with the throttle wide-open. Before starting, the engine was dismantled and various parts were cleaned, new piston-rings were installed, and the valves were reground.

TABLE III.—COMPARATIVE DATA ON BENZOL AND GASOLENE.

	Pure Benzol	Motor Benzol.	Gasolene.
Approximate flame-temperature, deg. fahr.			
With air	3,650	..	3,500
With oxygen	7,180	..	6,750
Heating value, B.t.u. per gallon	137,000	..	113,500
Air required for combustion of 1 cubic foot of vapor, cubic foot	36	39	45
Air vaporized per gallon, cubic foot	39	35	25

During the run with straight gasolene the engine developed 24 brake horse-power and consumed 19.1 gallons of fuel; or 2.94 gallons per hour. This is at the rate of 0.122 gallons per horse-power-hour. After this run was completed the engine was dismantled and what carbon had adhered to the top of the pistons was scraped off and weighed. On account of the shortness of the run there was only about 1.8 grams of carbon, some of which was due to the pressure of oil in the cylinder, caused, no doubt, by the installation of new piston-rings. The porcelain of the spark-plugs was slightly carbonized. The valves and valve-caps had a light carbon soot that could be scraped off readily.

For the run with the motor benzol we

[Read before the Society of Automotive Engineers.—Ed.]

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adopted the same procedure as when gasolene was used, reassembled the engine and put fresh oil in the crankcase. Then we adjusted the carburetor to a leaner mixture and retarded the ignition slightly. On this test the engine developed 26 brake horsepower and consumed 13 gallons of fuel. The increase in power over that of the gasolene run was noticeable. During this operation the consumption was 2.89 gallons per hour or 0.109 gallon per brake horsepower. This shows about 10.7 per cent. greater efficiency than the gasolene test. The engine ran more evenly throughout this portion of the test than in the previous run on gasolene, and did not appear to labor as much. An examination of the engine showed less carbon on the pistons; in fact, except for the small amount of carbon around the edges of two of the cylinders, there was not enough carbon to weigh. The centers of the pistons had practically no carbon, and the valves, valve-caps and spark-plugs were practically free of carbon. What little carbon we succeeded in locating was easily removed, due to the fact that it was not of the hard texture found when using gasolene as fuel. We also noted that the average temperature of the cooling water was not so high as when gasolene was used as fuel. With benzol we obtained a better running engine than when using gasolene.

In conclusion I wish to state that the real test of any fuel is the result obtained in actual service. However, we have data showing that we are about 10 per cent. better off in operating our fleet on motor benzol than we were when gasolene was used.

Want Non-Skid Roads

Highway engineers will be asked to find a way to make a smooth road foolproof in wet weather. Drivers believe it can be done, although the engineers as yet have not found a way. Through their national organization, the National Motorists' Association, vehicle owners will help solve the problem, if possible. But they want it solved, for the greatest single menace to the driver to-day, as they see it, in a smooth road in wet weather.

Thus far the problem of constructing and maintaining a smooth non-skid road has baffled the skill of the engineer. The only non-skid roadways in the country to-day are those constructed of brick or blocks of granite or other similar material. Such roadways are non-skid; but they wear rough generally in a short time and when in that condition are not conducive to smooth riding.

A concrete roadway can be made non-skid by scarifying, or roughening the surface before the top finishing hardens, but experience shows that it won't stay non-skid. Earth, waste, oil drippings from traffic, all fill up the crevices in short order with the result that the road is soon without the non-skid feature.

V. C. Smith, former factory manager of the Bethlehem Motors Corporation, has been named factory manager of the Allentown plant of the new Bethlehem Motors Corporation of New York.

From 20 Customers to 500 in Nine Months

By N. MARRA

General Manager, L. Marra & Sons, Paterson, New Jersey

OUR 1½-ton motor truck has lost only one day in the last 19 months. During the first 10 months we used it for hauling material for the National Biscuit Company. Then we bought out a bottling business and put it to work on deliveries.

In our bottling business we handle ginger ale, pop, mineral waters and soft drinks of all kinds. When we purchased the business 9 months ago we had only 20 customers. Now we have 500. Of course, this increase can not be attributed to any one cause; but we credit fully 50 per cent. of the increase to the excellent delivery service furnished by our truck.

The truck makes regular trips all over Paterson, also covering suburbs within a 6-mile radius. This includes North Paterson, Haledon, Mountain View, etc. The truck ordinarily makes two trips a day, starting out at 8 in the morning and finishing up about 7 at night during the summer time. In the winter the loads are lighter and the operating day is a little shorter.

On the average, the truck delivers twice a week to each customer, making about 50 stops a day. On Saturdays the loads are particularly heavy and the truck usually works until 1 o'clock in the morning. It often has to work on Sunday—in fact, it has worked fully 15 Sundays in the last nine months.

As a rule, the goods which we put on the truck are not orders already received, but represent our estimate of what our customers will want. We are able to figure this pretty accurately, so that as a rule the truck gets rid of most of its goods, and brings back to the bottling works a load of empties. It makes deliveries to groceries, families, stands, saloons, churches and carnivals.

Of course, we don't always put the same kind of a load on the truck. A typical load consists of 15 cases of 24 half-pint bottles, 35 cases of 12-quart bottles, and 15 cases of 24 twelve-ounce bottles. Such a load weighs a total of about 1½ tons. Even on our busiest days the truck seldom carries more than a capacity load.

In its 19 months of total service the truck has traveled a total of 20,000 miles. Slightly less than half of this mileage was made in the bottling business, the remainder having been made when hauling for the National Biscuit Company. During the 9 months it has been in the bottling business, repairs have not cost over $25. They were practically nothing during the first 10 months.

We estimate that this truck is easily good for 5 years. From our experience with trucks we judge that $200 per year will take care of repairs and maintenance. We use pneumatic tires and get a very high mileage, around 15,000. The truck averages 8 miles to the gallon of gasolene which is just as good as a common light truck that we also operate.

The truck—a Selden—carries both driver and helper, whose wages total $60 per week. It costs $15.80 per day, which is an average of 12 cents per case, and 1.25 cents per case-mile. The truck is not only delivering at a very low cost, but is also furnishing dependable delivery service—a very essential factor in our business. Our customers depend on our regular deliveries to supply their trade and if our truck was laid up part of the time, we couldn't hope to keep them. Our speedy, dependable truck has been an exceedingly important factor in increasing our business from 20 to 500 customers.

OPERATING RECORDS.

Total Period.

Period covered	9 months
Days operated	243
Total round trips	486
Deliveries—pickups	12,150
Total loads—cases	31,590
Miles traveled	9,474
Gasolene used—gallons	1,184
Cylinder oil used—gallons	39

Daily Averages.

Round trips	2
Deliveries—pickups	50
Total loads—cases	130
Miles traveled	39
Miles per round trip	19.5
Loads per trip—cases	65
Case-miles	1,267.5
Miles per gallon gasolene	8
Miles per gallon oil	243

COST RECORDS.

Investments.

Chassis, etc., complete	$3,060.00
Tire value (pneumatics)	357.20
Total, less tires, to be depreciated	$2,702.80

Fixed Charges—Yearly.

Interest on total investment @ 7%	$ 214.20
Taxes and licenses	7.50
Insurance	225.00
Garage expenses	90.00
Total per annum	$ 536.70
Total per month (per day $1.65)	44.73
Total for period—9 months	402.57

Variable Charges—Period.

Fuel at 23 cents a gallon	$ 272.32
Cylinder oil at 60 cents a gallon	23.40
Tires—9,474 miles ($357.20÷15,000-mile life)	225.48
Depreciation—9,474 miles ($2,702.80 ÷60,000-mile life)	426.33
Maintenance and repairs, estimated	150.00
Total variable charges	$1,097.53
Driver's wages—helper	2,340.00
Total fixed charges	402.57
Total operating cost	$3,840.10

Unit Costs.

Cost per day operated	$ 15.80
Cost per mile traveled	.41
Cost per case hauled	.12
Cost per case-mile	.012
Repair cost per mile—estimated	.015
Repair cost per mile—actual	.002

New Fuel from Africa

A. C. de Villiers, attorney of Edenburg in the Orange Free State, has invented "Springbok" motor spirit from prickly pear juice mixed with other chemicals, and a company with $500,000 capital has been organized to exploit it, according to the Department of Commerce. Non-corrosive and odorless, the spirit is said to equal gasolene in power and flexibility and can be sold at half the price. A plant has been obtained with 2,000,000 capacity, estimated as one-sixth South Africa's consumption. Cost of production is given as 18 cents a gallon.

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Highway Transport Courses

Arthur H. Blanchard, professor of highway engineering and highway transport at the University of Michigan, reports considerable growth in the interest shown in the subjects with which his courses deal. During the 1919-1920 season his students in the courses named numbered 29, the following year 45, and in 1921-1922 there were 94. The men in the last classes came from national, state, county and city highway departments, consulting engineers' offices, contractors' organizations, university faculties, companies making highway machinery, and the field of highway transport. Last June the university conferred 16 master's degrees on graduate students specializing in highway engineering and highway transport. The Board of Regents, in recognition of the rapid development of interest in this work, has given Professor Blanchard 26,000 square feet of space for the Davis Library of Highway Engineering and Highway Transport, offices, lecture rooms, drafting rooms and laboratories.

The university's short-period courses for the 1922-1923 season follow:

December 4 to 15, 1922.

C. E. 77. Highway Engineering Financing, Management and Organization—Professor Smith.

C. E. 81. American and English Highway Transport Methods — Professor Blanchard.

December 18 to 30, 1922.

C. E. 67. Highway Transport Economics and Surveys—Professors Blanchard and Smith.

C. E. 72. Gravel and Broken Stone Roads. Dust Prevention and Bituminous Surfaces—Professors Blanchard and Smith.

January 1 to 12, 1923.

C. E. 73. Brick, Cement-Concrete, Stone Block and Wood Block Pavements—Professor Bateman.

C. E. 80. Interrelationship of Highway, Railway and Waterway Transport—Professor Riggs.

January 15 to 26, 1923.

C. E. 69. Highway Laboratory Research—Professor Bateman.

C. E. 70. Highway Structures — Professor Gram.

C. E. 82. Highway Transport Costs and Record Systems—Professor Smith.

January 29 to February 9, 1923.

C. E. 68. Bituminous Macadam, Bituminous Concrete and Sheet Asphalt Pavements—Professor Blanchard.

C. E. 84. Highway Transport Management—Professor Smith.

M. E. 40. Mechanism, Operation and Maintenance of Motor Trucks, Tractors and Trailers—Professor Lay.

February 12 to 16, 1923.

Ninth Annual Michigan Conference on Highway Engineering.

February 19 to March 2, 1923.

C. E. 71. Highway Specifications, Contracts and Jurisprudence—Professor Riggs.

C. E. 79. Highway Transport Legislation and Traffic Regulations — Professor Blanchard.

March 5 to 16, 1923.

C. E. 75. Highway Engineering Seminar—Professors Blanchard and Bateman.

C. E. 76. Highway Engineering Theory and Design—Professor Smith.

C. E. 78. Earth and Sand-Clay Roads and Grading Machinery and Operations—Professor Bateman.

C. E. 83. Highway Transport Seminar—Professors Blanchard and Smith.

$75,000,000 Asked for Roads

Sponsored by the Tennessee Good Roads Association, a movement is now under way for the authorization of a $75,000,000 bond issue to complete the highway system of the state. The proposed issue would be against an anticipated capitalized fund of $4,900,000, to be raised by combining the present federal-aid and state money with all of the motor-vehicle taxes and by an additional fund of $800,000 to be realized by a tax of 2 cents per gallon on gasolene.

Completed Federal-Aid Roads Total 17,700 Miles

10,200 MILES FINISHED LAST YEAR

Ten thousand miles of completed federal-aid highways were added to the mileage of the nation's good roads during the last fiscal year, according to a compilation just completed by the Bureau of Public Roads, United States Department of Agriculture. The bureau finds that the present calendar year has broken all records for road construction. Based on all available data, which are not complete, however, the bureau estimates the total sum to be spent in the United States this year on highway construction at $742,000,000. The figures include federal-aid roads and projects built in addition by the states and smaller municipal units without the aid of federal funds.

At the beginning of the last fiscal year, according to the bureau's figures, the total mileage of completed federal-aid highways was 7,500. There were under construction at that time an additional 18,000 miles in various stages of completion. The close of the fiscal year finds the total completed mileage of federal-aid roads more than doubled, reaching a total of 17,700 miles. Federal-aid highways under construction at the end of the fiscal year totaled 14,500 miles, which, in the aggregate, were estimated by the bureau to average 56 per cent. of completion.

The total mileage of federal-aid highways completed during the past year was highest in Texas with 933 miles. Five states—Arkansas, Georgia, Iowa, Minnesota, and North Carolina—each reported more than 500 miles of federal-aid highways completed within the year and two states, Montana and Wisconsin, completed more than 400 miles each.

England Will Tax Fuel

England will go back to taxation of motor gasolene and abandon taxation by horse-power, if a scheme is adopted which has been drafted by organized motor users and manufacturers. The plan proposes a tax of 10 cents a gallon on all imported gasolene, and should provide the $51,250,000 revenue now paid by motor vehicles. It would go into effect in 1924.

Advantages of this system are declared to be uniform assessment, cheap collection, and greater freedom for expansion of the motor industry. Under present conditions, the tendency is to manufacture machines of low horse-power, to escape taxation, and to restrict the use of motors to certain seasons of the year. Revenue is collected without regard to road usage, and the new proposal is that substantial grants from the tax income shall be made for up-keep of roads.

Manufacturers say that unless they can build machines of higher horse-power for home use, they will be handicapped in competing for dominion and foreign markets. A levy on gasolene refined in England from imported crude oil is also proposed, but no tax would be assessed against motor spirits wholly produced in England.

Commerce Reports on Loose Leaves

Systematizing of "Commerce Reports" by adoption of loose-leaf manual form has been suggested to officials of the Department of Commerce by the National Automobile Chamber of Commerce as representd by J. Walter Drake and G. F. Bauer, chairman and secretary, respectively, of the Foreign Trade Committee, and Gordon Lee, chief of the U. S. Automotive Division.

This change, if effected, will be a distinct advantage to business men generally. Valuable information, now perishable in many instances, could readily be stored for future use in devising foreign sales campaigns that, based on facts, would be directly reflected in domestic prosperity.

"'Commerce Reports' in its present form," Mr. Drake said, "represents a material advance over the publication issued prior to appointment of Secretary Hoover. This advantage has resulted from the grouping together of all foreign trade information that pertains to a certain class of commodities. Much more, however, can still be done to make the publication of increasing value to American business. Timeliness, accessibility of information and saving in effort by subscriber to keep material available for future use, are factors still needing consideration. Loose-leaf manuals issued by the different commodity and economic divisions of the Bureau of Foreign and Domestic Commerce, offer the solution. By their use, a report on a specific subject received today at the Department of Commerce from an American trade official abroad, could be condensed at once, edited, multigraphed and mailed to subscribers before the day is over. The report, because of its timeliness, becomes of greater value to business, than if it were retained and published at end of the week.

"Accessibility to information for future use, would be also readily afforded under the manual method. On each loose-leaf appears information pertaining to but one country and one main phase of an industry. When the country differs, or even the subject of the report begins to change, additional sheets are prepared to afford segregation of material according to different countries and character of information. The sheets, before being sent out would be indexed by country and subject, and thus given a fixed place in the manual where it may always be consulted as occasion demands.

"Conservation of time and work on part of subscriber is another benefit that would accrue from manuals. Ready reference to articles, now appearing in 'Commerce Reports,' is possible only as result of considerable work. To accomplish it, clipping, pasting, marking and indexing must be resorted to by the subscriber. Under the manual arrangement, these tasks would be eliminated. Inserting of sheets in the manual at places definitely designated in advance would be the only work required. General satisfaction would be thus assured."

The directors of the Indiana Truck Corporation have declared their regular quarterly dividend, No. 23, of 1¾ per cent. on the preferred stock of the corporation, payable October 1, 1922, to stockholders of record, September 30, 1922.

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Street-Cars Cheaper Than 'Buses

By J. C. THIRLWALL
Railway Engineering Department, General Electric Company

THE electric railways have been and are still one of the most essential factors in the growth and prosperity of the modern industrial city and their cultural effect on the health and happiness of the communities, through the reduction of congested tenement-house districts and the distribution of the population into the suburban areas, has been of tremendous importance. To-day, however, we hear from many sources the claim that their day has passed, that a new form of transportation is ready to supersede the trolley-car, that the automobile and the motor 'bus will push the railway with its rolling-stock, overhead lines, substations and power-station into the discard, even as the horse-car and its motive power were forced into the scrap heap or boneyard thirty years ago. If the motor 'bus, with its self-contained power-plant, is inherently cheaper in terms of passengers carried a given distance than the electrically propelled rail-car, the laws of economics would force its use to the exclusion of its older competitor. If, on the other hand, it is not the cheaper, only an overwhelming superiority in speed or in comfort or convenience could justify its adoption.

We are interested in maintaining the superiority of our art; we are vitally concerned in defending the property of the corporations for whom we work or to whom we sell our product. It is incumbent, therefore, upon electrical engineers to ascertain the true facts and to present them to the municipal authorities, and to the public who are compelled to avail themselves of some form of transportation other than the privately owned automobile.

We have seen in the past five or six years a tremendous amount of sporadic and irresponsible competition develop in cities all over this country between gasolene driven cars of all sizes and the local railways. We have seen these piratical "jitneys" take away from the established transportation companies a large part of their traffic; we have seen in several places, notably Bridgeport, Des Moines, Toledo, Muskegon and Saginaw, a temporary abandonment of rail service and the attempt of the gas 'bus people to handle the entire passenger transportation of the community; but we have not yet seen, nor, I believe, will we ever see, gasolene 'buses successfully handling mass transportation and giving a commensurate degree of continuous service at a cost as low as can be provided by the electric railway.

What success, financially, has attended gasolene 'bus operation, has been on relatively short hauls on selected routes, and with no attempt to provide the extra equipment demanded by rush-hour traffic; under similar conditions the railway could show a very much better financial return on its entire investment. Let us, therefore, consider some definite figures bearing out this assertion.

So long as the various municipalities are content to offer the use of smooth pavements free of charge to all commercial vehicles except the railway-car, and compel the rail-car rider to pay not only for the rails, ties, and foundation upon which the car rolls but also for the paving inside and outside the rails, a tremendous bonus is offered to the users of the 'buses.

The cost of building and equipping an electric railway route on a paved street is to-day about as follows, on the basis of the following costs:

UNIT COST.

Single track for safety-cars, per route mile	$45,000-$55,000
Double track for safety-cars, per route mile	80,000- 90,000
Trolley-line for safety-cars, per route mile	4,500- 5,500
Transmission line, per route mile	1,500
Generation station, per kw. installed	125
Substations, per kw. installed	50
Shops, per car owned	1,250
Safety-cars, each	6,000
Trolley 'buses, each	6,000- 7,500
Motor 'buses, each	5,500- 7,000

COST PER ROUTE-MILE.

	Minimum headways 15 minutes	10 minutes	5 minutes
Track and paving	$45,000	$50,000	$85,000
Distribution and transmisison lines	6,000	6,500	7,500
Generating and substations	3,000	4,500	9,000
Shops	1,300	2,000	4,000
Cars	6,000	9,000	18,000
	$61,300	$72,000	$123.500

Of these items, the use of gasolene 'buses eliminates the first three, constituting from 80 to 90 per cent. of the rail companies' investment, but, as shown subsequently, their investment in rolling stock is materially greater. The rail costs just cited are based on the use of the smallest and lightest car yet used or developed, the Birney type of 1-man car, some 5,000 of which are in use on about 300 railways in this country. The car is about 29 feet long by 8 feet wide and can carry with reasonable comfort a maximum rush-hour load of 32 seated and 28 standing passengers, a total of 60. The very largest gasolene 'buses used in this country are only 21 feet long by 7 feet 4 inches wide; their floor area is, therefore, about 65 per cent. of that of the street-car, and their maximum capacity, with equal space per passenger, is only 40, 28 of whom get seats. To carry away an equal number of people, therefore, would require 50 per cent. more vehicles. We are sometims referred to the double-deck 'buses operated on Fifth Avenue in New York, and on Michigan Avenue in Chicago, as being examples of greater 'bus capacity. Those are used by pleasure riders, and are not suitable or practical for business transport. More than one railway company has tried the experiment of putting seats on the roofs of street cars, but found it slowed down their schedules too much, due to the time consumed in boarding and alighting. Moreover, both these 'bus companies operate over the best paved streets in the country, under unusually favorable conditions for attracting sightseeing traffic, at a 10-cent fare for a fairly short ride.

Gasolene 'buses of the size mentioned weigh from 10,000 to 11,000 pounds and cost about $7,000 to $7,500, and their garage, due to underwriters' requirements, costs a good deal more than a similar size railway-shop. The investment in rolling-stock and buildings, therefore, is just about double, for the gasolene installation, what is required by the railway, or $14,000, $21,000 and $42,000, respectively, for the three classes of service previously mentioned. This still leaves a materially higher total investment in the railway property, amounting to $47,000, $51,000 and $81,500 per route mile, but the fixed charges are not commensurate.

An average of many appraisals by competent engineers shows that a balanced average of 3.2 per cent. annually on the original value, if set aside as a sinking-fund, will cover the entire depreciation of an electric railroad and its equipment. In the case of a 'bus installation, the 'buses themselves, with a life of but 10 to 12 years, constitute so large a proportion of the total investment, and the life of the engine and transmission, which make up about 25 per cent. of the cost of the 'buses, is so short (about 4 to 5 years) that we estimate a sinking fund of 6.9 per cent. of the original cost must be set aside annually. Interest charges on new capital to-day in the transportation business are about 7.5 per cent; taxes average about 2.3 per cent; total fixed charges, therefore, for the electric railway, are about 13 per cent, and for the gas 'bus company about 16.7 per cent.

Applying these values to the average investment costs per route mile, gives

	Railway.	'Bus Company.	'Bus Saving.
For longest headway	$ 7,960	$2,340	$5,620
For medium headway	9,360	3,500	5,860
For short headway	16,050	7,000	9,050

The saving for the 'buses in fixed charges amounts, therefore, to from $5,600 to $9,000 per mile of route and constitutes the only argument in their favor. For, despite their greater flexibility of movement as regards other vehicles in their path, they can not and do not average a higher speed schedule than the street-car under similar conditions of load and of frequency of stops. Their free running speed is somewhat lower than that of the rail-car; their acceleration is much slower, and the time taken by passengers climbing in or out of their high hung bodies is considerably more than on the modern low-wheel electric-car. These handicaps fully offset their advantage in other respects and produce a schedule speed approximately the same as a street-car, or from 9 miles per hour in frequent-stop service up to 12 miles per hour in suburban

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runs. Comment on comfort, to anyone who has ridden in them, is superfluous. It is a conservative statement that they have no advantage over the street-car in this respect.

And now let us consider the relative cost of operation. Records from seven 'bus companies, operating in New York, Chicago, Baltimore, Fort Worth, Akron, San Francisco and Seattle, show an average operating cost of 28 cents per car-mile. These 'buses are of several sizes and weights, from the 6,000-pound 14-seat design used in Fort Worth and Seattle, up to the 10,000-pound double-deckers in New York and Chicago. Some use solid and some pneumatic tires. Making adjustments in costs to put them all on the basis of 10,000 pounds and with solid tires we get the following segregations of costs in cents per 'bus-mile:

Tire expense	2.0c
Body and chassis	2.0c
Engine and transmission and control	4.3c
Total maintenance	8.3c
Gasolene and lubricants	7.2c
All other expenses, chauffeurs, garage, supervision, insurance, etc. (1-man operation)	1.23c
Total operating costs	27.8c

If pneumatic tires are used, this cost will be about 3 cents per mile higher.

Now compare that with rail costs. Last year the entire city service in Terre Haute, Indiana, was handled by the Birney safety-car at an operating cost of but 12.5 cents per car-mile. Records from 10 companies, operating 500 of these cars, showed an average cost of 16 cents per car-mile; and their average on 13 Stone & Webster properties was 16.5 cents. Some of these installations had been in service only a year or two, some as long as five years. Allowing for a slight increase in maintenance as their age increases, we believe the following figures are a conservative estimate for the cost of operating this 16,000 pound rail-car, the capacity of which is 50 per cent. greater than that of the 'bus:

Maintenance of way and structure	1.8c
Maintenance of equipment	1.7c
Power at 1.5 cents per kilowatt-hour, A. C.	2.5c
All other expenses	12.0c
	18.0c

This shows a saving of 9.7 cents per car-mile, as compared with the gasolene bus, of which 4.5 cents is in the power bill and 4.8 cents in the maintenance accounts, even after paying for the norimal upkeep of track and paving. The car-miles or bus-miles run annually per route mile operated may be readily calculated.

Assume a route 4.5 miles long, with street cars making the round trip, including lay-overs at the ends of the line, in 60 minutes or at the rate of 9 miles per hour for 18 hours a day 365 days in the year. Each car will run approximately 59,000 miles annually. On a 15-minute headway 4 cars would be required, making 236,000 miles; on a 10-minutes headway 6 cars, making 354,000 miles; and on a 5-minute headway 12 cars, making 708,000 miles per year; or approximately 52,500, 78,700 and 157,000 car miles per route mile per annum.

For the busses we will assume that similar midday and evening headways will be sufficient, but that for 7 hours of heaviest riding 50 per cent. more busses must be operated to give equal passenger capacity. The total bus mileage, therefore, will be 282,000, 404,000 and 848,000 per year, or approximately 63,000, 94,000 and 188,000 bus-miles per route mile, an increase of about 20 per cent.

The total operating costs at 18 cents and at 27.8 cents per mile, respectively, become for each route mile:

	Basic headways 15-minute.	10-minute.	5-minute.
Rail-cars	$ 9,440	$14,160	$28,300
Gasolene 'buses	17,600	26,200	52,500
Excess cost of 'bus operation	$ 8,160	$12,040	$24,200
Deduct savings in fixed charges	5,620	5,860	9,050
Net saving by rail-way	$ 2,540	$ 6,180	$15,150

It is evident from these figures that as traffic density increases the bus becomes relatively more and more expensive, and since, even on 15-minute headways it can not compete on an economic basis, we are justified in the conclusion that it has no field in urban transportation.

But there are suburban communities where no commercial transportation now exists, there are others whose citizens, to reach an adjacent suburb, may have to ride a long roundabout route, transferring to and from lines that radiate out at different angles from a common center. The local transportation company may not feel able to justify the expense of laying rails to such suburbs, because of the relatively small traffic that could be secured, nor to install gasolene 'buses because of their high operating cost. To meet such a situation, the trolley 'bus was thought to hold out attractive possibilities, and the General Electric Company last summer co-operated with the Atlas Truck Corporation of York, Pennsylvania, to develop and try out the first successful vehicle of this character in the United States.

Referring to the gasolene 'bus figures previously quoted, the maintenance of the driving mechanism and of power are extremely high, 4.3 cents and 7.2 cents, respectively, being the average. On the rail-cars the corresponding costs are 0.5 cents and 2.5 cents, 8.5 cents less per mile. There is no reason to assume a higher maintenance for electrical equipment on a rubber-tired vehicle than on a rail-car. Indeed, it might be less. The motors being suspended higher above the street should be better protected from snow, dust or water, and the method of support eliminates many of the vibration stresses met with in rail work. Also the power consumption, though greater per ton-mile because of the higher rolling friction, should be slightly less than that of the safety-car because of the reduced weight.

A rail-car takes, in frequent-stop service, about 130-watt hours per ton-mile at the car. At the D. C. side of the substation, line losses increase this to about 150 watt-hours, and at the power-station it will be about 175 watt-hours; or, for a safety-car with average load, about 1.66 kilowatt-hours per car-mile, A. C. output.

The corresponding figures for a rubber-tired 'bus on good pavement are approximately 165 watt-hours per ton-mile at the 'bus; 190 at the substation and 225 at the power-house. For a 'bus weighing 13,000 pounds loaded, the average power taken from the generating plant would be about 1.46 kilowatt-hours per 'bus-mile.

The trolley 'bus will have a slight excess cost over the gasolene 'bus for maintenance of overhead lines, which we estimate at 0.7 cent per 'bus-mile, but its net saving in operating costs should be about 8 cents per mile, or a total cost of 19.8 cents per 'bus-mile, as against 27.8 cents for the gasolene 'bus.

The annual cost of operation, based on the same assumptions as to mileage as in the previous comparison, is per route mile operated, for the three classes of service:

	Headway Short.	Medium.	Long.
Rail-cars	$28,300	$14,160	$ 9,440
Trolley 'buses	37,250	18,600	12,500
Gasolene 'buses	52,500	26,200	17,600

The investment cost for the trolley 'bus installation includes all items required by the rail system, except the track, and requires a larger investment in line because of special hangers and double trolley, and in stations because of the greater number of cars operated. The total cost and annual charges would be per route mile, as compared with the rail system and the gasolene 'bus operation, as follows:

	Rail-cars.	Trolley 'bus.	Motor 'bus.
Long Headway—12-15 Minutes.			
Annual mileage	52,500	63,000	63,000
Total investment	$61,000	$23,800	$14,000
Fixed charges, per cent	13	13.5	16.7
Annual operating cost	$9,440	$12,500	$17,600
Annual fixed charges.	7,960	3,220	2,340
Total annual cost	$17,400	$15,720	$19,940
Medium Headway—8-10 Minutes.			
Annual mileage	79,000	94,000	94,000
Total investment	$72,000	$33,000	$21,000
Annual operating cost	14,160	18,600	26,200
Annual fixed charges.	9,360	4,450	3,500
Total annual cost	$23,520	$23,050	$29,700
Short Headway—4-6 Minutes.			
Annual mileage	157,000	188,000	188,000
Total investment	$123,500	$60,500	$42,000
Annual operating cost	28,300	37,000	52,500
Annual fixed charges.	16,050	8,200	7,000
Total annual cost	$44,350	$45,200	$59,500

The investment figures given above for the rail system cover today's cost in paved streets. If the track is on a private right of way, or through unpaved streets, costs will be $15,000 to $20,000 a mile lower; moreover, a very large proportion of existing trackage, buildings and stations which are in good operating condition were constructed when costs for material and labor were much below those now prevailing. For these reasons it should not be assumed that it would be economy to substitute trolley 'bus operation, even on 15-minute headways, for an existing rail route, at least until the track wears out.

The advocates of the gasolene 'bus frequently refer to the successful operation of the Fifth Avenue Coach Company and of the Chicago Motor 'Bus Company as illustrations of what might be expected elsewhere. Both these companies do show a profit in handling urban passenger traffic in gasolene vehicles, but only because they carry an unusual volume of pleasure riders, tourists and sightseers on a double-deck car (which is impractical for business transport), and at a rate of fare far in excess of that charged by the railways in the two cities.

Since there is only one commercial installation of trolley 'buses operating in this country, and this for less than a year, we

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Electric Taxicab Appears at New York Electric Show

50 TO BE USED IN GOTHAM SERVICE

A comprehensive display of electric trucks, passenger-cars and industrial trucks made up one of the most important departments of the New York Electrical and Industrial Exposition held during the week of October 7 to 14 at the Grand Central Palace, New York City. Occupying more than half the second floor of the building, they formed a distinctive exhibit and were a center of interest for merchants and manufacturers who are confronted with delivery problems.

On Tuesday, October 10, the exhibitors held an electric truck parade, the first ever undertaken in New York. More than 150 vehicles participated, rolling down Fifth Avenue in a column that extended nearly a mile. Although the parade was held under the auspices of the manufacturers, the trucks themselves were entered by users and owners. Eighty different owners represnting thirty different classes of service put their delivery equipment in the parade. Not the least interesting element of the proceedings was the fact that not in years have so many commercial motor vehicles been seen on "the avenue" at one time. Several years ago Fifth Avenue placed a ban on motor trucks of all sorts and restricted itself exclusively to passenger-cars. This ban was temporarily lifted to permit the holding of the parade. Following the parade there was a perceptible increase in interest in the vehicles shown at the show.

The show served to introduce to New York its first electric taxicab. The vehicle, one of fifty being built by the Rauch & Lang Corporation for the Electrotaxi Corporation of 1292 Madison Avenue, will go in service on November 1. The first ten have been completed and the balance will follow as the business increases. The cabs are painted a combination of two tones of grey, in striking contrast with some of the color schemes adopted by taxicab companies. They have a wheel-base of only 102 inches and will be easy to handle in the traffic congested streets of New York. Their maximum speed is 25 miles an hour. Their operating radius of 120 miles a day is accomplished by means of an interchangeable battery system. The battery cradle is especially designed for rapid changing, and it will be impossible to remove an exhausted batterly and replace it with a fresh one in less than 5 minutes. It is also expected that the electric cabs will be a big factor for safety on the crowded streets. The insurance companies give a 25 per cent. reduction in the premium for liability insurance.

The Electric Vehicle Bureau of the New York Edison Company displayed an interesting series of charts pointing out the advantages of electrics. One of these showed that the electric vehicle investment in New York is $23,000,000; another showed that five electric wagons require no more street space than three horse-drawn vehicles of the same capacity; another showed that 2,448 of the electrics in New York are more than seven years old, that 1,285 are five years old and that 25 are 21 years old. With this chart was the significant phrase "Figure out Depreciation." Another chart was called the "Dollar Race" and showed graphically the relative distances that electric and horse-drawn vehicles of different capacities could cover at an operating expense of one dollar.

Among the vehicle exhibitors at the show were the Milburn Wagon Company, the Baker Rouch & Lang New York Corporation, the Commercial Truck Company, O. B. Electric Vehicles, Inc., the Walker Vehicle Company, the Ward Motor Vehicle Company, the Steinmetz Electric Motor Car Corporation, and the Kelland Motor Car Company, Storage batteries, motors, charging appartus and accessories were exhibited by the Cutler-Hammer Manufacturing Company, the Edison Storage Battery Company, the General Electric Company, the Philadelphia Storage Battery Company, the Westinghouse Company, and the Electrical Repairs Company.

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can not speak with certainty as to the ultimate cost. But we can say that the installation of 7 'buses in Staten Island has been operating continuously since October, 1921, through several heavy snowstorms the past winter, over severe grades and under many difficult physical conditions, including one route of very rough roadway. No breakdown or interruption to service has occurred, due to the electric drive or collection of current, and the operating expenses, both power and maintenance, have been well within our estimates.

In conclusion, we believe that for all routes extending into the business center of large or medium size cities, the rail-car offers the most efficient and most economical form of transportation: for suburban feeder and cross-town service, the trolley 'bus will be the most suitable vehicle; and that only special conditions that prevent the erection of an overhead line would justify the use of gasolene 'buses inside the city limits.

Wants State to Regulate Trucks

A plea for state regulation of mortor truck frieght and passenger transportation in order to prevent encroachment upon the business of the railroads was made by John N. Glenn, manager of the Illinois Manufacturers Association, in an address recently at Aurora, Illinois. He said:

"So much business has been diverted from the railroads to automobiles, coupled with the inability of the public highways to meet the demands, that it is imperative that this control be assumed. Railroads, even with gasolene propelled engines, can not meet truck competition, because they pay enormous prices for original purchase and maintenance of right of ways while the commonwealths maintain the truck highways. Illinois is spending $60,000,000 for new highways, which are being destroyed as fast as they are built by the heavy traffic."

Several thousand cotton pickers are being despatched by motor truck from Nogales to Phoenix and other Salt River Valley cities in Arizona. Food is provided en route and the laborers are carried directly to the plantation where they are to work.

Trailer Rental Plan Aids Road-Train Transportation

5-TON UNIT LEASED FOR $35 WEEKLY

Renting trailers or selling trailers on a rental basis, as typewriters and some other pieces of machinery are handled, is a novel method in the motor haulage business. The Martin Rocking Fifth Wheel Company of Springfield, Massachusetts, has just announced that it is going to follow this plan. In speaking of this new departure Mr. Martin says:

"We find that there are many merchants having much trucking to do, such as the lumber dealer, the contractor, the truckman, who realize in a general way that the trailer would materially reduce their hauling costs, yet for various reasons hesitate to adopt them. We decided, by taking this step and assuming all risk ourselves, that we could conclusively demonstrate that the trailer is a big money-saver, yet, by receiving rental, we would be paid for the demonstration. The very small charge that we make, $1.00 per day per ton capacity, will pay us and also pay a handsome return to the renter. For instance, a trucking company running between Springfield and New York, getting $1.00 a hundred and making two round trips a week, has an earning capacity with a 5-ton trailer (which he can easily pull in addition to his regular load) of $400 a week and our rental charge is only $35.

"While the economies of the trailer system have been known for some years, general conditions have been such the past two years that very little new equipment of any kind has been sold but the indications are now that the trailer will come into its own. Every motor truck manufacturer is making and listing short wheel-base trucks to be used as tractors. The General Motors Truck Company has just announced a line of tractors from 5 to 15 tons capacity. The Pierce-Arrow Company makes a specially geared truck for a tractor; in fact, every make of truck in the country is being used for hauling trailers.

"Great Britain is ahead of us in the use of the tractor-trailer principle. The officials there are advocating it as the most effective means of curbing the constant ruthless wear and tear of the highways. Just as large loads can be carried when the weight is distributed over a number of axles as when it is all put on one axle."

Booth Manages Hyatt Sales

H. A. Brown Jr., manager of the Motor Bearings Division, Hyatt Roller Bearing company, Detroit, announces the appointment of F. E. Booth as sales manager. Mr. Booth, who is a graduate of Yale-Sheffield school, has had extensive engineering and sales experience, both before coming to the Hyatt company and since joining that organization. He possesses in addition an unusually sound training for sales work through having spent considerable time in the Hyatt factory on problems of production and engineering.

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Motor Transport and Laws Regulating It

By J. B. MANSFIELD
President, Detroit Trailer Company

IT IS my opinion that successful motor truck transportation will be done largely in the future on the strength of the scientific surveys of the operator's business. In the past it has been the tendency of the operator of motor trucks to use larger size trucks, thereby carrying heavier tonnage. The state legislatures and highway authorities seek to combat this tendency in their effort to prevent rapid destruction of expensively built highways.

The serious problem confronting the entire country to-day is to find where the descending curve representing decreased hauling costs crosses the ascending curve representing increased road maintenance. This is a matter of public interest, because the public pays the bill for transportation and also pays the bill for highway work. The economic sphere of motor vehicle use ends at the point where the value it adds to commodities ceases to justify the cost of transporting by that means.

The solution of the highway and traffic problem lies in the distribution of gross weight over more wheels and a longer wheel-base, which frequently results in a saving in transportation costs as well. State legislatures have sought to prevent concentration of excessive weights by limiting the load capacity or gross weight of vehicles. Such legislation makes it certain that the intent is to prevent concentration of weight. This object is accomplished when a given load is hauled on 6 or 8 wheels instead of 4 wheels.

Instead of putting forth their best efforts to get laws that would enable our country to be served, dishonest truck manufacturers' lobbyists have endeavored to eliminate real highway transportation. For instance, when we consider the gross weight laws that exist in the country to-day, we find that one state has 6¼ tons gross; another state has 8 tons gross; another has 9 tons gross; four states have 10 tons maximum; three states have 11 tons; three states have 12 tons; two states have 13 tons; three states have 14 tons; and three states have 15 tons. Fifteen tons is the highest gross weight limit prescribed for four wheels. California, Michigan and New Jersey have the 15-ton limit. About twenty states have no restrictions on the gross weight. Approximately one-half of the states have a maximum permissible load based on the width of the tires. This load ranges from a maximum of 500 pounds in Idaho, Oregon and Texas up to 800 pounds, which is the weight recommended in the uniform vehicle law. This has been adopted by about a dozen states including: Connecticut, Illinois, New Jersey, New York, Pennsylvania, Washington, Wisconsin, Minnesota, Massachusetts, Maine, Kentucky and Iowa.

In the state of Ohio the Burke law, which permits a gross load of 20,000 pounds, limits the tire load to 650 pounds per inch in width. Seventy per cent. of the gross load must be carried on one axle. Traction engines are permitted a gross load of 12 tons. Now there are practically no traction engines used to speak of in the state, and those that are used are employed in road-building work. The state highway department will permit a traction engine for the threshing of grain to go over the highway with steel tires, yet it makes no provision for semi-trailers or 6-wheeled transportation units which would enable the trucking interests to haul on the same basis allowed traction engines of 14,000 pounds per axle, permitting a load of 28,000 pounds on a tractor and semi-trailer, or 8½-ton pay-load

I would like to see a uniform motor vehicle law carry the following provisions: That the weight on tires shall be 800 pounds per inch in width; that no tire shall be permitted on the highway that is not at least one inch of rubber, and that, when the tire has but one inch of rubber, the vehicle can operate at only one-half of the rated capacity. On tractor and semi-trailer units the maximum load should not exceed 22,500 pounds gross per axle. Trailer combination consisting of tractor, semi-trailer and 4-wheel trailer should not exceed 85 feet in length. On all semi-trailers and 4-wheel trailers lights should be arranged on the left side. These lights should be of sufficient strength to show up vehicles clearly.

We need better highway engineers. There have been too many kinds of roads built. The government experimental roads and various other roads that have been built for test purposes have demonstrated beyond the shadow of a doubt that a large proportion of our so-called fine highways have been just an excuse to get the people's money for the cheapest possible good roads.

Enough pressure should be brought upon the various state highway departments to build roads at least 20 feet wide and state highways enjoying federal-aid should be 24 feet wide. A United States government should not cooperate with any state or county by the advancement of federal-aid funds unless a complete system of highways is built. This would eliminate political graft, whereby hundreds of millions of dollars have been spent in building fine highways for politicians throughout this country from a town or city out to their country homes. In practically every state in the union one will see this piece-meal construction of highways, with a nice bit of highway that runs out to some politician's house, where it stops.

This country needs two systems of land transportation. We can not depend entirely upon the railroads to-day. When the strike came on in 1920 where would the people of this country have been, had it not been for the motor truck and trailer, which stepped into the breach and kept our large cities from starving? In my own plant I hauled steel from Pittsburgh, Chicago, Racine and other points. I got my material in less time than I could ship it in by express and in a great many instances we received our trucks and trailers from distances of 200 to 300 miles quicker than we received the invoices from the firms we purchased them from.

We must foster and cement a better feeling between truck associations, the railroads, truck manufacturers and trailer manufacturers. The railroads to-day are paying and paying dearly for their lack of fair play. The truck manufactuers are paying dearly to-day for the rotten laws that they have had framed in the various sections of the country.

There is great need for close attention to legislation in the various states. In Michigan our legislature meets next January. I am advised that there are at least sixteen bills aimed at the hauling industry that will be presented during the coming session. At least four of them are being sponsored by railroad interests, one is sponsored by a certain truck interest. The others are the product of a few fanatics, who wish to have a special road built, so that they may take their "flivvers" out to ride on Sunday afternoons. To prevent these bills from becoming laws, the close cooperation of owners, manufacturers and kindred interests is absolutely necessary.

We should obey our traffic laws in the interests of safety. Unless we do, we make it hard for ourselves, our fellow truckmen and for every truck owner. Let us go to the next legislature in our state with clean hands and ask for fair laws. We need a uniform law for each state, laws that will operate as well in one state as another, instead of the jumbled up mess we now have. Let's quit sending politicians and jackleg lawyers to our legislatures and congress. Let us send men who will be on the square with all concerned and enact reasonable laws that will not restrict the development of motor transportation, but will assist in the growth of an industry that is proving a most economical method of hauling goods.

Two New Gill Rings

Two new piston-rings, known as the "special Oil-Wiper" and "Servus Step-Cut," are announced by the Gill Manufacturing Company, Chicago, maker of the Gill interlocking-joint piston-ring. The "Special" ring is of the oil-wiping type, with a square oil return space around the bottom. The "Servus" ring is a step-out ring. Like the Gill interlocking-joint ring, these rings have their tension cast into them, each ring being individually cast out of round of a grey iron composition. All rings are also lathe-turned for quick seating, lapping themselves in against the cylinder walls to form a seal that is oil-proof and gas-tight.

Manufacture and distribution of these rings is already going forward on a large scale. Thirty-six Gill branches in principal cities assist in the maintenance of stocks of 11,000 sizes and oversizes in the hands of dealers and jobbers throughout the United States.

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Rail Motor Makes 460-Mile Run

Two railway motor-cars and one trailer coach, all equipped with semi-steel bodies built by the J. G. Brill Company, have been placed in passenger service on the lines of the Cape Fear Railways. They will be used on a 10½-mile run between Fayetteville and Camp Bragg, North Carolina, in addition to a 3½-mile run in the city of Fayetteville. One of the cars will operate independently, while the other will pull the trailer coach. The motor-cars are identical in design and construction, having a baggage and a passenger compartment. The passenger compartment seats 16 persons and emergency seats of the folding type for 11 passengers are provided in the baggage compartment. The trailer coach is equipped to handle passengers only and has a seating capacity of 40. When the trailer is used in conjunction with one of the 16 motor-cars, the 2-car unit has a seating capacity of 56 passengers or an emergency capacity of 67.

The two motor-cars have electric starting and lighting outfits, sanding devices, air-brakes and heating devices which utilize the heat from the motor exhaust, while the trailer coach has air-brakes, electric lights and heaters. The cars are well finished inside and afford a comfortable means of transportation to the public.

In delivering the equipment from Philadelphia to Fayetteville, North Carolina, a distance of 460 miles, under their own power, the longest single run yet made with rail motor equipment was completed without difficulty. On this run the motor-cars were hooked on to either end of the trailer coach and the one at the front was used as the power-unit. They left Philadelphia at 8:00 A. M. and arrived at their destination the same evening after making a number of stops to show the cars to railroad officials along the line. This 460-mile run was made over the tracks of the Baltimore & Ohio, the Richmond, Fredericksburg & Potomac and the Atlantic Coast Line Railroads. An average of 6.1 miles per gallon of gasolene was made, although considerable fuel was used in idling the motor and in backing on to sidings. This mileage was made with only one of the cars being used as a power unit and pulling a trailer and a dead motor-car, and a speed of as high as 27 miles per hour was attained.

Martin Joins Fageol

Fred L. Martin, sales manager of the Sheldon Axle & Spring Company, has resigned, effective December 31, to become eastern district representative for the Fageol Motors Company, of Oakland, California. The Fageol inter city coaches and 'buses, which have been developed along original lines, are to be sold direct through zone managers. Mr. Martin's new work, therefore, embraces a wide territory and is rich in possibilities, on which he, a staunch believer in the future of the motor 'bus, is himself thoroughly "sold."

Mr. Martin's connection with the Sheldon organization dates back to 1911, even before the introduction of the worm-geared axle. The development of the 'bus business promises much for the builders of components, he believes.

Handling Heavy Hardware at 24.79 Cents a Ton-Mile

By JOHN J. MEAD

President, John J. Mead Company, New York City

PROMPT delivery service is the foundation of our business. We are a relatively small concern dealing in marine and heavy hardware, and supplying shipbuilders, railway contractors, factories, barge builders, dock builders, and mills in New York City and vicinity. There are, of course, a great many concerns in this business, and many that are much bigger than we are. These big fellows would quickly run us out of business except that we beat them on delivery service.

Our customers are always in a hurry for things. On a shipbuilding job, for instance, some heavy hardware may be needed quickly in order to keep the gang of laborers busy, and it means a big financial loss to the contractor if he can't get the stuff in a hurry. A great many contractors patronize us because of the prompt and satisfactory delivery service made possible by the 1¼-ton truck which we purchased in December, 1919. With this truck, we can make deliveries before the big jobbers can find the material in their warehouses and load it on their trucks.

The truck makes a great many deliveries in New York City; it also does all our hauling to Jersey City, Perth Amboy, Newark, Hackensack, Long Island City, East New York, Tottenville, and Patterson. The longest trip that we regularly make is to Perth Amboy, which is 36 miles away. On several occasions, however, we have made longer trips in emergencies. The truck made one run to Atlantic City, for instance, a distance of 165 miles each way. The entire round trip was made in 24½ hours, making the average speed about 14 miles an hour.

On these trips the truck carries castings, bolts, rivets, nuts, block and tackle, mortar and concrete mixers, and forges. It is averaging 65 miles a day, making four trips and 22 stops. Its average load is 1¾ ton.

During the year we have been operating it the truck has been laid up only five days for adjustments. Repairs have cost us a total of only $150. These low repair charges are especially remarkable because the truck is operating over bad roads. Most of the time it is also driving through very heavy traffic, which necessitates frequent stops and starts. This is hard on the truck, and also tends to increase the gasolene consumption per mile.

All the minor adjustments and repairs on the truck are made by our driver. If anything serious goes wrong, we send to the local service station, where we always get first-class service. This is a very important consideration with us, because we haven't the facilities for making difficult repairs, and are absolutely dependent upon the local service station.

The record of our 1¼-ton Garford shows that the truck cost $14.10 a day, 21.69 cents per mile, $2.01 per ton, and 24.79 cents per ton-mile. These costs include the driver's wage, and an estimate of $250.00 for mainteance and repairs the second year, and $400.00 the third year. We figure the minimum life of the truck at 60,000 miles. The truck is getting 8.7 miles per gallon of gasolene, a remarkably high mileage in view of road and traffic conditions.

Average Cost.	
Cost per day (including driver)....$	14.0987
Cost per mile	.2169
Total cost for period	3,736.15
Operation.	
Days operated	265
Miles traveled	17,225
Miles per day	65
Miles per gallon of gasolene	8.7
Miles per gallon of oil	243
Itemized Cost.	
Driver cost per day (included above).$	6.0755
Depreciation per mile	.0413
Maintenance and repair:	
Actual, total	150.00
Actual, per mile	.0087
Estimated, per mile	.0137
Tire cost, estimated, per mile	.0108

Shuler Reorganization Complete

After several months of reorganization, the Shuler Axle Company, of Louisville, is again in active operation. The refinancing program has been completed, and ample cash resources are available to insure the continued growth and development of the company.

The official personnel of the Shuler Axle Company has been rounded out by the appointment of W. E. Dugan as vice-president and general manager, and the reappointment of F. A. Shuler as director of engineering and manufacturing. These two officials will have active charge of the manufacturing and sales policies of the company. The Shuler factory is rapidly being placed in production on a complete line of front axles for motor coaches, trucks, tractors and trailers.

Mr. Dugan is well-known in the automotive industry. He was manager of the Cincinnati axle plant of the Standard Parts Company. During his eighteen years' experience in the industry, he has served also as factory manager for the United States Motor Truck Company and for the Selden Motor Vehicle Company.

Frank A. Shuler, who resumes the portfolio of director of engineering and manufacturing with the reorganized company, is one of the most widely known axle men in the country. Before he started the original Shuler Axle Manufacturing Company, several years ago, Mr. Shuler had been associated with the Timken organization almost without interruption since its beginning.

The Shuler company is building front axles exclusively. A prominent feature of the line is the Shuler wheel brake, a mechanism permitting simultaneous braking on all four wheels. Patents on this device were granted during the past summer.

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Norway Offers Good Field for American Trucks

By J. R. COMPTON

THE last Norwegian registration of motor vehicles, taken last October, shows that there are 3,072 trucks in the country. Of these, 2,037 are stated to be of American manufacture, the bulk of the remainder being German. American and German forces are strongly entrenched in the field, and the Norwegians themselves aspire, in a motor sense, to be self-supporting. Ninety per cent. of the motor vehicles in Norway in 1918 were of European manufacture, but the coming of peace gave American makers an opportunity which they were quick to seize. The Americans, however, have to contend to a greater degree than England with a fluctuating and unfavorable exchange, and this, together with the long sea journey, somewhat discounts the advantage gained by plentiful stocking and efficient service. Germany's low exchange is negatived by slow delivery, while the endeavor to make Norway self-supporting as to transport vehicles is extremely doubtful of success except in the case of those types of motor vehicle comparatively simple in construction, and those also for which there is a considerable demand.

The American exports to Norway for 1914 and for the three completed years since the coming of peace are instructive:

Year.	Trucks.	Tractors.	Parts.	Tires.
1914....	2	...	$ 1,895	$ 5,650
1919....	815	138	481,885	1,057,140
1920....	829	159	604,675	1,687,985
1921....	20	22	227,895	363,925

From these figures it will be seen that, owing to overstocking and economic stringency, imports from America practically disappeared. The market for parts and tires fell considerably also, but, naturally, maintenance of the vehicles already in the country saved the accessories figures from such a cyclonic depression as overtook the truck and tractor figures.

Owing to the less efficient data issued by other exporting countries, it cannot be stated whether the slump in demand was in their case parallel to American experience. Most probably not so. Great Briatin's 54 complete vehicles and 11 chassis for 1920 perhaps fell 50 per cent. last year. Germany from May to September last year sent to Norway 14,010 tons of cars and chassis—figures that may mean anything. Canada sent 66 vehicles last year, a fall compared with 1920, but the great majority of these were passenger-cars. The same may be said of the imports from Italy, totaling 51 vehicles during the first six months of last year, against 172 for the whole of 1920. In case it might be of assistance in conjecture, it might be stated that official Norwegian figures show that 4,432,328 tons of motor vehicles were imported in 1920, while for the first ten months of last year only 353,674 tons weight were imported. These figures at least show that America suffered above the average in proportion to the volume of its trade.

Much attention is being given to railway construction in Norway, and tens of millions of kroner are being expended in this manner annually. Building and up-keep are, however, both costly and arduous in a cold, mountainous, sparsely peopled country like Norway, and even long-distance traffic is in the nature of an economic conundrum. It is not surprising, therefore, that, while motor transport is growing, railway freights are declining, and deficits increase, despite the bolstering of tariffs. The freight carried per mile of line fell from 167 tons in 1916 to 146 tons last year, while the tariff per ton-mile averaged only Kr. 0.10 (1.8 cent) in 1916, but was as high as Kr. 0.31 (5.6 cents) last year. General electrification is regarded as being the panacea for Norway's railway troubles, but as yet only 50 miles of line have been so converted, and total conversion will occupy a generation and cost a milliard of kroner.

The problem of making the less important and branch lines paying propositions has induced railway authorities to consider the general introduction of gasolene rail cars to displace locomotives over the shorter routes, says Motor Transport. Recent experiments show that while the operating costs of a locomotive over a 160-mile run worked out at Kr. 140 ($26.36), the expense incurred with an 11-ton 80-horsepower gasolene rail car only amounted to Kr. 91 ($16.44) over the same stretch of line. Most of the rail cars at present in Norway are Opels, but American interests are striving hard to negotiate what might develop into a very big order.

Much is being done to increase the 13,422 miles of motor roads that Norway at present possesses. During the last Budget period Kr. 12,638,000 ($1,584,500) were spent, mostly on road and bridge construction and improvement of roads. Other items entailing expenditure were the administration, survey, and upkeep of roads, state subsidy to motor services, and experiments with new road surfaces. The amount above mentioned does not include the money spent in initiating emergency road work for the relief of unemployment.

Norwegian roads are usually blocked by snow against vehicular traffic between November and April. With a view to mitigating this handicap a number of snow-plow experiments were undertaken last winter. The results showed that horse-drawn plows were more expensive than motor-driven plows and that, after heavy falls of snow, ordinary trucks and tractors were hardly powerful enough to do the work efficiently. Four-wheel-drive vehicles were found to be best suited to snow removal, but, to insure their superiority, such vehicles should be so equipped that they can be used in summer for street-cleaning and sprinkling. As a result of these trials it is expected that many municipalities will be investing in motor snow-plows during the coming winter.

Another type of municipal vehicle in demand in Norway is the motor fire-engine. Norwegian towns are (owing to the fact that wood enters very largely into building construction) very susceptible to devastating fires and efficient precautions are very necessary. The Bergen Fire Brigade recently invited tenders for a motor fire-engine, it being stated at the same time that the firm successful would get repeat orders. Other local bodies have also been giving orders for motor fire-engines and aerial ladder trucks.

It is very possible that within a few years electric vehicles will be widely used in Norway. Much turns on the result of extensive trials now being undertaken as to the efficiency of a newly invented storage-battery stated to cost no more to make than the ordinary article, but capable of running a vehicle considerably further. Norway's hyro-electric power potentialities are enormous.

The government, with a view to protecting the roads, has enforced a law stipulating that all motor trucks of less than 3,360-pound capacity should be fitted with pneumatics, while heavier vehicles so shod are not taxed so heavily as those running on solids. A further regulation demands that the width of tires used be greater than those ordinarily used in other countries. America leads in the Norwegian tire market, France and Great Britain following.

The cost for gasolene, long a cause for dissatisfaction among Norwegian truck users, has fallen considerably this year, mainly as a result of government activity. Recently the A/S Norsk Braendselolje was formed with a view to underselling the oil trusts, and it is freely stated that the government has a financial interest in this concern. Five tanks with a total storage capacity of 20,000 tons have been erected outside Christiania for the purpose of supplying the motor needs of the south-eastern portion of the country. Other tanks are to be erected at Stavanger, Svolvaer and Aalesund. It is probable that Norway will always be dependent on foreign countries for motor fuel, though probably the shale deposits in the Island of Auden could be profitably worked.

New Pneumatic Truck Tire

The Seiberling Rubber Company announces a new pneumatic truck tire which is called the All-Tread and which now is in production in the following sizes: 30 x 3½, 32 x 4½, 34 x 4½, 33 x 5, 34 x 5, 36 x 5, 36 x 6, 38 x 7 and 40 x 8. The 30 x 3½ is of 3.85 dimension, 6-ply, for Ford trucks and for use on Ford passenger-cars where road conditions are severe.

The feature of this new model is that the tread design is extended down the side walls, the heavy bars running almost to the bead. The tread rubber goes from bead to bead and is extra heavy, of about 4200 pounds per square inch tensile strength. There is an extra wide breaker strip, a double thick cushion of rubber between the last few plies.

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How to Improve City Traffic

By JOHN T. COULTER

DETAILED recommendations for the improvement of municipal traffic conditions are contained in the report for 1922 of the Committee on Traffic and Transportation of the American Society for Municipal Improvements. While these recommendations are offered merely as suggestions for subjects to be discussed by the society in convention, it is believed that, unless contrary views attain ascendency there, they will be submitted for final adoption at the 1923 convention. The recommendations are the result of much work devoted to the subject by the Traffic and Transportation Committee, of which Arthur H. Blanchard, professor of highway engineering and highway transport at the University of Michigan, is chairman. He was assisted by Robert Hoffman of Cleveland and Charles O. Boyd of Beckley, West Virginia.

Members of the society are urged to discuss with the members of their state legislatures the following dimensions and weight regulations for motor trucks wtih a view to incorporating sane regulations in state laws which would be effective in all cities within a state passing such legislation.

Maximum width of motor truck chassis or body, 96 inches.

Maximum overall height from base of tire to highest point of vehicle or load, 12 feet 6 inches.

Maximum overall length vehicle, body and load, 30 feet.

Maximum weight per linear inch of width of solid rubber tires, measured at the base of the rubber, 800 pounds.

Maximum gross weight on one axle, 22,000 pounds.

Maximum gross weight of motor truck and load, 28,000 pounds.

In its 1923 report the committee intends to present recommendations pertaining to trailers, and maximum speeds for motor trucks and trailers operating within cities on different classes of streets for different types of motor trucks and trailers.

The committee proposes that the cost of reconstructing pavements and foundations on streets in business districts and main through trunk thoroughfares be financed by general appropriations and in no cases by assessment against abutting property.

The committee has arrived at the following tentative conclusion; that no licence fees be charged for the operation or ownership of motor vehicles by any city, but that all such license fees should be collected by the state and that a certain proportion thereof should be distributed to the cities by the state and be credited to the street-maintenance funds.

The committee tentatively recommends that each highway transport company operating an express, freight or passenger service on a definite route and in accordance with a time schedule be required to obtain a franchise from a state commission, particularly appointed for this purpose, and be required to secure the permission of all cities through which it operates to use a definitely prescribed route therein.

It is also suggested that, at all corners at which turns are made on through routes in municipalities, direction signs be erected and, at the city limit on each route, a large map sign be erected, which will show the plan of all through routes in the municipality, giving the names of the streets and the principal adjoining cities to which each route leads.

The committee tentatively recommends that raised car-stop safety zones be universally employed in place of safety zones designated by limit lines, stanchions or mushrooms. It also recommends that no stopping, ranking or parking be allowed at the curb opposite the safety zones and for a distance of 10 feet each side the safety zones.

Railroad grade crossings are a constant source of accidents. It is evident that their total elimination is desirable, but unfortunately is not practicable in all cases in the present state of the financing of highway improvements. Much can be done by proper design to reduce traffic hazards in the case of railroads crossing highways at grade. A clear sight of the railroad crossing for 500 feet on each side materially reduces accidents and a clear sight of the railroad for 1,000 feet on each side of the highway is desirable. The width of all roadways crossing railroads should be at least 20 feet. For a distance of 100 feet on each side of the railroad, the grade of the highway should be level or not over 2 feet rise or fall in 100 feet. The suggestion by some officials to construct humps in the highway to slow down traffic approaching railroad crossings is unreservedly characterized as pernicious.

Proper danger signs should be located at 200 feet each side of grade crossings in municipalities and, in sections which are poorly lighted at night, a large electrically lighted rectangular sign carrying the word, "Danger," in red letters should be suspended directly over the center of the street at the grade crossing.

The committee recommends the adoption, as far as practicable, of uniform traffic regulations for vehicles and pedestrians in municipalities. It is the intention of the committee to present a complete set of fundamental regulations in its 1923 report. In this report there is included only regulations relative to which there may be differences of opinion. The following regulations are suggested:

No person shall operate an automobile, motorcycle or other motor vehicle on any street or public highway in the business or public highway in the business portion of the municipality at a greater rate of speed than 15 miles an hour or on any boulevard, drive or parkway at a greater rate of speed than 15 miles an hour, provided such parkway or boulevard drive shall have signs placed at the entrance thereof to indicate such rate of speed, or on any street or public highway elsewhere in the municipality at a greater rate of speed than 20 miles an hour.

Vehicles turning to the left into another street shall pass to the right of and beyond the center of street intersections, before turning, and in congested districts where traffic policemen are stationed at street intersections, an approaching automobile or vehicle shall signal the officer and shall not pass such officer until receiving proper signal from said officer.

Any person or persons operating or driving any motor vehicle or other vehicle shall, at the intersection of any public street or highway, within the limits of the municipality, keep to the right of the intersection of the center of such street or highway when turning to the right of such intersection.

When vehicles approach an intersection of two or more public streets or highways the vehicle approaching from the right of the driver shall have the right of way.

No vehicle shall turn to proceed in the opposite direction except at street intersections.

A vehicle shall not stop on a crosswalk nor within the intersection of two or more roadways.

No vehicle shall stop on any street, except within one foot of the curb, or in such way as to obstruct free passage on the street, provided that this rule shall not apply when a driver of a vehicle is compelled to stop for a standing street-car.

Drivers of motor vehicles before starting, turning, stopping, backing or changing their course, shall make sure that such movement can be made with safety and shall give definite visible signal of such intention.

No vehicle shall stop anywhere in the city with its left side to the curb.

Each bicycle shall be equipped with a suitable horn or bell for giving warning or signal of its approach and, during the hours when lights on the streets are lighted, shall be equipped with a suitable headlight.

The chief of police may, from time to time, prohibit or regulate the stopping, ranking or parking of motor vehicles or other vehicles in any district where such stopping, ranking or parking will interfere with traffic or the public safety, and no vehicle shall be parked at any time within 15 feet of any fire hydrant.

Not more than two persons shall occupy the front or driver's seat of an automobile, except that a child less than ten years of age may occupy the front or driver's seat as a third person and no person, adult or minor, shall be seated in the lap of the

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driver nor shall the driver be seated in the lap of a person when the automobile is in motion.

No motor vehicle having an over-all length greater than 20 feet shall be diagonally or perpendicularly parked at a street curb except when loading or unloading.

The following pedestrian traffic regulations are suggested:

Except where safety zones are established, pedestrians shall stand on the sidewalk while waiting for street-cars until the street-car is within 200 feet or less from the stopping place and when alighting from street-cars pedestrians shall not stand in the street but shall proceed immediately to the sidewalk to the right, except where safety zones are provided.

Pedestrians shall not step from the sidewalk nor from between or back of vehicles in crossing a street without looking in both directions to see approaching vehicles, and shall cross only at right angles with the street.

It shall be the duty of all pedestrians to observe the line of traffic at street intersections and to obey the signal of policemen who are directing the movement of such traffic and they shall not cross before the signal is given for the traffic to move in the direction toward which the pedestrians are crossing.

Pedestrians shall not cross the street intersections diagonally but they shall cross only one street at a time, using a crosswalk, if designated, or otherwise shall cross at right angles with the street.

Pedestrians crossing the street in the congested district or the business district or crossing any main thoroughfare shall do so only at street intersections or crosswalks. Pedestrians crossing any street at a point other than a street intersection or crosswalk outside the congested district or business district or main thoroughfares shall exercise due diligence for their own protection and safety.

Output for October Rises

Production of motor vehicles running 20 per cent at above September was reported to the directors' meeting of the National Automobile Chamber of Commerce in New York. The total output for the entire industry for October, based on statements of shipments, is estimated at 244,000 cars and trucks. The best previous October record was 200,000 in 1919.

Increased availability of coal, which was relatively scarce in September, largely accounts for the unusual October increase. The production of the latter month met a number of unfilled orders, as well as supplying October sales which were about 25 per cent under September in most sections of the country. The fall months, though seasonally less than the summer, are expected to register the best autumn trade on record.

Six states—Massachusetts, Ohio, Maine, Colorado, New York and South Dakota—report improvement in the movement of used machines. Shortage in freight transportation is maintaining the truck market at the September level, with Massachusetts, Texas, Pennsylvania and Ohio showing increases.

Motor Coal and Ice Delivery Costs $1.108 a Ton

By J. A. YARBROUGH

Yarbrough & Bellinger, Charlotte, North Carolina

WE ARE now operating our second motor truck, which is performing very satisfactorily. It delivers around 2,400 tons of coal and ice a year, and operates for only $13.30 a day with driver and helper, or $1.108 a ton. The trucks have helped materially in serving a bigger territory, and their dependability has enabled us to satisfy our customers.

We are one of the largest coal dealers and ice manufacturers in Charlotte. We have been using motor trucks for ten years—in fact, we had the first truck in Charlotte. Our new truck has an express body suitable for handling either coal or ice.

During the winter this truck hauls coal in bags and in bulk making deliveries to homes, stores and institutions. In the summer it hauls ice, usually in wholesale lots to big customers, such as soft drink parlors, dairies, hotels, etc. As a rule the truck carries about three tons to the load. Most of the coal is delivered within a radius of 2½ miles, but some of the ice is delivered 30 miles away.

OPERATING RECORDS.

Total Period.

Period covered	21 months
Days operated	356
Total round trips	1,425
Deliveries—pickups	1,425
Total loads, tons	4,274
Miles traveled	7,442
Gasolene used—gallons	1,488
Cylinder oil used—gallons	69

Daily Averages.

Round trips	3.8
Deliveries—pickups	3.8
Total loads, tons	12
Miles traveled	20.9
Miles per round trip	5.5
Load per trip, tons	3.2
Ton-miles (12 tons—2.75 miles)	33
Miles per gallon gasolene	5
Miles per gallon oil	108

COST RECORDS.

Investments.

Chassis, etc., complete	$3,750.00
Tire value	464.10
Total, less tires, to be depreciated.	$3,285.90

Fixed Charges—Yearly.

Interest on total investment (5 years) at 6%	$ 135.00
Taxes and licenses	25.00
Insurance	200.00
Garage expenses	.....
Total per annum	$ 360.00
Total per month (per day $1.80)	30.00
Total for period—356 days	641.18

Variable Charges—Period.

Fuel at 25 cents a gallon	$ 372.00
Cylinder oil at 56 cents a gallon	38.64
Tires—7,442 miles ($464.10÷9,000-miles life)	384.01
Depreciation—7,442 miles ($3,285.90 ÷21,000-miles life)	1,164.67
Maintenance and repairs (estimated)	712.42
Total variable charges (per day $7.50)	$2,671.74
Driver and helper (per day $4.00).	1,424.00
Total fixed charges	641.18
Total operating costs	$4,736.92

Unit Costs.

Cost per day operated	$ 13.30
Cost per mile traveled	.636
Cost per ton hauled	1.108
Cost per ton-mile	.403
Repair costs per mile—estimated	.096
Repair cost per mile—actual	....

Approximately equal quantities of coal and ice are handled in the course of a year, the yearly total averaging about 2,400 tons. The truck runs only 200 days in the year on account of the variable demand. The trucks do a great deal of Sunday work, particularly hauling ice. For the period from July 22, 1920, to May 3, 1922, the truck—a 2½-tonner—ran 7,442 miles, an average of about 21 miles a day. It averages 4 trips a day, and one stop a trip.

At our ice-plant the ice comes down in wooden chutes to the loading platform and is pushed by hand on to the truck. Coal is loaded into the truck by hand. A helper is carried to save time in loading and unloading.

Repair costs on the truck have been nominal so far and we estimate tthat $400.00 a year will cover this item. We have good drivers, and give the trucks a periodic inspection. The truck ought to run a minimum of 17,000 miles, or about four years, and the trade-in allowance justifies figuring its life at 21,000 miles, or about five years. There is no garage charge because the truck is kept in the open.

This machine operates for $13.30 per day, 63.6 cents a mile, $1.108 a ton, and 40.3 cents a ton-mile. Deducting the wages of driver and helper, the cost a day is only $9.30.

These costs are very satisfactory for the conditions under which we operate. When the town was two-thirds its present size, we could deliver at a lower cost a ton with horses, but the radius of our territory has increased considerably, and horses are no longer so economical as trucks.

Trucking Race Horses

During the show season the Blue Ribbon Stable of Colonel J. L. Mead, whose hobby is horses, does as much jumping from town to town as a show troupe making one-night stands. Under the circumstances arranging satisfactory transportation facilities is a knotty little problem.

Very few fairs or races are held within a radius of 75 miles of Springfield, Ohio, in which Colonel Mead's horses do not participate—and generally win prizes. What is more, they go in their own "limousine." The spacious White truck in which the Blue Ribbon stable travels can comfortably accommodate nine horses, facing either to one side or standing three abreast, three rows deep, facing the driver's cab. The horses are kept from usurping more than their allotted "stall" space by means of restraining chains, which are padded to prevent chafing.

During the off season for races and fairs, Colonel Mead keeps his truck busy hauling stock and grain for farmers. Besides his own stable, he also transports the racing horses of his neighbors during the show and race season.

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Traffic on Nebraska Roads

The total daily traffic over Nebraska roads is estimated to be 5,900,000 miles. This estimate is based on figures given out by the State Department of Public Works which recently collected some interesting and valuable data on the subject of Nebraska traffic.

Eighteen representative stations were chosen on the state highways. These stations were located at some distance from towns, and localities where peculiar conditions would make traffic unusually heavy were avoided. Observations were made from 6:00 A. M. to 8:00 P. M. every day between August 20 and 26.

Some of the data supplied by the survey are very enlightening. There was a total of 89,318 vehicles which passed these stations during the time covered, or an average of 708 per day for each station. As would be expected, automobiles comprised a large proportion of the traffic, or a total of 80,113. There were 5,836 trucks, or a daily average per station of 46.

"Old Dobbin" has not entirely quit the road, for we find there were 3,369 vehicles drawn by horses. Sixty-one per cent. of the horse-drawn vehicles were hauling loads and 39 per cent. were hauling passengers.

As might be expected, the local county traffic was heaviest, comprising about 54 per cent. of the total traffic; inter county traffic, about 31 per cent., and interstate traffic, about 15 per cent.

The interstate traffic consisted of 13,560 automobiles and 382 trucks. This class of traffic was heaviest at the station near Fairmont, with Millard and North Platte stations close second and third.

The largest number of interstate trucks was observed at the station near Dakota City with 41 vehicles. The York station, near the central part of the state, was second with 30 vehicles.

There are about 5,000 miles of state highway in Nebraska. It may be supposed that the stations selected were fair averages for the state. It is estimated that 60 per cent. of the traffic of the state is over the 5,000 miles of state highway. This would give the figures as set forth in the first sentence—5,900,000—as the daily traffic mileage over Nebraska roads.

At 12 miles per gallon for all vehicles, including trucks, it would take nearly a half million gallons of gasolene daily to supply the motor power for Nebraska traffic.

Excluding Sunday on account of the predominance of pleasure traffic on that day, commercial traffic is found to be heaviest on Saturday, Wednesday, Friday and Thursday in the order named, and lightest on Tuesday and Monday. There is an apparent tendency for traffic to increase as the week passes. The same tendency is observable in studying the variation of traffic from hour to hour. Starting at 6 A. M. traffic increases rapidly up to 9 o'clock, then stands practically on a level until noon, when there is a slight falling off until 1 o'clock, the forenoon level is then maintained with fair steadiness until 4 o'clock, when there is a considerable increase until 5. The greatest volume of traffic passes between the hours of 5 and 8 p. m., the hour between 7 and 8 showing the peak of the day's traffic with nearly 10 per cent. of the total.

Motor Transport in Rumania

There are several companies operating motor transportation and freight lines in Rumania, but owing to the cost of repairs, the wear and tear of tires due to the state of the roads and probably careless handling in some cases, there is little profit in this business under the system hitherto adopted. Quite recently an interest has been expressed in 2- and 2½-ton trucks for road transport, worked in conjunction with a 2-ton trailer. Thus the load would be 4 tons for each machine and trailer. This distribution of the load over four axles will probably prove more practicable than the use of heavier trucks. Many of the main roads in old Rumania are practically unmade, so that the weather constitutes a serious factor with which this business has to contend. At the same time high-priced goods can be transported economically from and to the large centers of population by this means, and there still remains a good field for those firms that are able to buy trucks and import them to Rumania for the purpose of entering the transport business.

Motor Truck and Passenger-Car Production

The following figures show the annual and monthly output and shipments of motor trucks and passenger-cars and index numbers showing (a) the relation between each month's output and the average monthly production for 1919 taken as 100 and (b) the relation between each month's shipments and the average monthly shipment for 1920 taken as 100.

	NUMERICAL DATA					INDEX NUMBERS				
	Production.		Shipments			Production.		Shipments		
Year and Mo.	Trucks.	Cars.	By Railroad.	Driven Away.	By Boat.	Trucks.	Cars.	By Railroad.	Driven Away.	By Boat.
1913 monthly av.	1,958	38,458	....	....	....	7	28	...	...	...
1914 monthly av.	2,115	45,307	....	....	....	8	33	...	...	...
1915 monthly av.	6,167	68,218	16,048	....	....	23	49	77	...	...
1916 monthly av.	7,500	124,468	22,598	....	....	28	90	108	...	...
1917 monthly av.	10,680	145,066	22,462	....	....	41	105	107	...	...
1918 monthly av.	18,938	77,199	13,456	....	....	72	56	64	...	...
1919 monthly av.	26,364	138,138	23,726	....	....	100	100	113	...	...
1920 monthly av.	26,837	156,930	20,922	39,239	4,698	102	114	100	100	100
1921 monthly av.	12,090	127,916	16,263	12,031	1,854	46	93	78	31	39
1920.										
May	.....	.....	21,977	74,286	....	...	...	105	189	...
June	.....	.....	22,516	60,746	8,350	...	...	108	155	178
July	.....	.....	23,082	52,342	8,702	...	...	110	133	185
August	.....	.....	23,386	34,060	7,095	...	...	112	87	151
September	.....	.....	20,804	24,431	5,469	...	...	99	62	116
October	.....	.....	17,209	14,127	2,519	...	...	82	36	54
November	.....	.....	13,253	9,497	659	...	...	63	24	14
December	.....	.....	11,802	6,469	89	...	...	56	16	2
1921.										
January	.....	.....	6,485	3,185	93	...	...	31	8	2
February	.....	.....	9,986	7,507	99	...	...	48	19	2
March	.....	.....	16,287	9,939	75	...	...	78	25	2
April	.....	.....	20,187	14,197	1,619	...	...	96	36	34
May	.....	.....	18,608	15,193	2,381	...	...	89	39	51
June	.....	.....	20,269	18,834	3,947	...	...	97	48	84
July	10,766	165,574	19,514	15,533	3,726	41	120	93	40	79
August	13,080	167,705	20,758	15,218	3,595	50	121	99	39	77
September	13,648	144,669	19,002	13,840	2,959	52	105	91	35	63
October	12,813	134,734	17,717	12,926	2,214	49	98	85	33	47
November	10,010	106,042	14,240	10,505	1,402	38	77	68	27	30
December	8,307	70,690	12,100	7,500	134	32	51	58	19	3
1922.										
January	9,358	81,693	15,357	7,479	143	35	59	73	19	3
February	13,133	109,170	19,636	10,173	180	50	79	94	26	4
March	19,665	152,959	27,753	16,917	560	75	111	133	43	12
April	22,237	197,221	31,334	22,381	2,960	84	143	150	57	63
May	23,694	232,431	34,324	28,760	7,366	90	168	164	73	157
June	25,982	263,008	33,000	30,500	7,900	99	190	158	78	168
July	21,357	224,057	29,116	28,100	10,034	81	162	139	71	213
August	24,200	249,225	32,814	36,754	10,096	91	180	157	98	214
September	18,843	186,562	25,950	30,005	8,002	71	135	124	76	170

Solid Tire Production

The following figures show the changes in solid tire production by years and months, the index figures being based on the average monthly output for 1921 which is taken as 100:

	NUMERICAL DATA.			INDEX NUMBERS.		
1920—	Production.	Stocks.	Shipments.	Production.	Stocks.	Shipments.
November	21,355	298,875	34,217	60	129	78
December	16,297	303,473	40,828	46	131	93
1921—						
January	21,220	303,753	29,116	60	132	66
February	23,355	304,374	29,599	66	132	67
March	28,710	283,800	43,926	81	123	100
April	28,859	269,985	42,080	82	117	96
May	35,156	264,633	40,122	99	115	91
June	28,395	240,336	49,867	80	104	113
July	35,123	220,003	55,678	95	95	127
August	55,694	216,367	66,886	158	94	152
September	37,441	161,832	50,276	106	70	114
October	46,274	163,299	45,911	131	71	104
November	45,537	173,451	34,556	123	75	79
December	40,478	168,515	39,520	114	73	90
Total for year	424,242	.....	527,517	...	...	...
Monthly average	35,354	230,862	43,960	100	100	100
1922—						
January	40,224	181,769	33,294	114	79	76
February	39,492	183,448	36,805	112	79	84
March	49,433	182,197	48,350	140	79	110
April	46,664	173,748	52,309	132	75	119
May	57,640	170,904	60,711	163	74	138
June	66,089	169,808	63,408	187	74	144
July	72,000	176,000	60,000	203	75	136
August	84,000	190,000	69,000	237	82	157

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A Place for 'Buses in Street-Railway Industry

By T. B. LANCASTER

AT THE recent convention of the American Electric Railway Association that body's Committee on Railless Transportation presented its first report on the policy that the street-railway industry should adopt toward the motor 'bus and the trolley 'bus. The report indicates that the transportation requirements of any community should be filled by the electric railway company, although 'buses, as supplementary equipment, have their "proper" place. Its report in full follows:

"We have considered the subject of railless transportation as including the use for passenger transportation of either gasolene propelled or 'trackless trolley' 'buses, designed for such service and operated to furnish regular daily service of the standard required of electric railway companies. We do not consider that irregular, unregulated service with unsuitable vehicles, like the usual 'jitney' offers, comes within the purview of our study and report.

"We believe firmly that all the transportation requirements of any community should be furnished by one agency and that that agency should be the electric railway company. It alone has the trained organization and ripe experience required for handling passenger transportation problems and the development of any other agency for handling those problems would result in a duplication of service which could produce only a higher cost of transportation for the public. We have already to a large extent convinced the public that our business is a natural monopoly, as is evidenced by many rulings of state commissions in eliminating or refusing permits for duplicate service. The public should, therefore, look to the electric railway company as the sole transportation agency, should give it such extensions of service as it wants, if the request is reasonable and the need apparent. Hence it is our duty, as public servants charged with the responsibility for conducting the highway transportation in our respective communities, to study and consider the availability of every feasible unit or method for furnishing this service.

"We find that railless transportation has come to be recognized by the electric railway industry as an aid to transportation if properly fostered, and is recognized by regulatory authorities as a menace unless properly supervised and controlled and required to pay its just share of taxes and public charges. We find also that the automotive industry has progressed in the past few years to the point where it is now producing vehicles of a design suitable for passenger transportation service. In the light of these findings the questions arise as to the economic and practical field of usefulness of the railless vehicle.

"It is recognized that the electric-car running on rails is the most essential, reliable and economical method of urban, suburban and interurban travel, considering the transportation problem as a whole and especially for mass transportation. This condition arises largely from the fact that the operating cost per passenger is higher for 'bus operation than with electric-cars.

"There is, however, a field in transportation in which the railless vehicle can furnish service satisfactory alike in operation and economy, that is, where the traffic is so light that the higher cost per passenger for operating the 'bus is offset by the relatively high fixed charges per passenger with such light traffic which result from the electric railway's investment in track. The possibility of utilizing the motor 'bus or trackless trolley should, therefore, be kept in mind by electric railway operators, either, where they are confronted by the necessity of extending transportation service into sections where traffic will be light, or in the economically similar situation of being required to rebuild tracks on a line where the traffic is too light to warrant the track investment. In the latter case the economic procedure might be to abandon the track and install 'bus service. We can not state with more exactness just where railless transportation should be adopted, but feel that the individual operator will be able to decide as to the possibilities of these new facilities wherever careful analysis of any given situation shows that the trackless vehicle can be used to advantage.

"We considered the question of entering into the costs of operation of various types of trackless vehicles and can do no more than to recommend the study of the data sheets compiled by the American Electric Railway Association. There has not been enough general experience to justify the publication of the figures obtained. The independent operators have not kept figures that can be considered reliable as they are not kept in accordance with the Interstate Commerce Commission system which has been adopted by most state regulatory bodies. This is also true of figures on trackless trolley operation.

"One of the most important matters affecting the cost of 'bus operation is that of special taxes or charges by states or municipalities for the wear on pavement or road surface caused by 'bus operation. This question is receiving every year more study by state legislatures and other governing bodies, resulting in many cases in recommendations or legislation increasing these charges. Governmental policy on this subject is still in too indefinite shape to admit of a general statement at this time, other than to say that the matter should be weighed in considering the adoption of railless transportation in any locality, and to recommend the further study of this phase of the subject by our association.

"A committee of the Engineering Association was instructed to study the subject of railless transportation from the viewpoint of design, and has made a careful study of the situation and collected data which are on file at the headquarters of the association. We feel, however, that the development of motor and trackless trolley 'buses, as adjuncts to the electric railways, is still at too early a stage to warrant the recommendation at this time of standards of design. We feel that in this matter individual companies must be governed by their local requirements, working in collaboration with the various manufacturing interests.

"A corresponding committee of the Transportation and Traffic Association was instructed to work with us and has also collected valuable data which are on file at the association headquarters.

"We have given some consideration to the effect of 'bus service upon the financial situation of the electric railways. The basic transportation service in any community is and will be furnished upon rails. Trackless service will be found supplementing but not competing with that of the electric railway. The 'bus may be considered an additional equipment for the street-railway. If the service of both means of transportation are co-ordinated, the net return of each will be reflected in the net return of the electric railway. New capital is annually required in the operation of a street-railway. Part of this new capital may well be used in the development of trackless service in the field above mentioned. Present investment in the electric railway is thereby conserved, the growing demands for service met and the return to the investor stabilized.

"In addition to the function of supplementing the street-railway service at the same rate of fare, there has been found to exist in some of the larger cities a demand (at a higher rate of fare) for a transportation service in addition to the electric railway which shall insure a seat for every passenger. Such service is similar to that furnished by the Fifth Avenue Coach Company in New York and by others in Chicago, Baltimore and other cities. This service is furnished by 'buses; it costs more to furnish than the existing electric-car fare will pay for, but it is believed to be proved, in this and other kinds of business, that the public is willing to pay a rate of fare which will compensate for the cost of the service it wants.

"The possibilities of development of transportation with railless vehicles should interest the industry greatly, and we feel that the study of the development in the design and construction of railless vehicles and their adaptability for highway transportation should be carried on further by a committee of the association.

"Our conclusions and recommendations may be summarized as follows:

"1. The electric-car is, with minor exceptions, the most reliable and economical method now known for handling local passenger travel, especially mass transportation.

"2. The automotive industry has developed a vehicle suitable for passenger transportation.

"3. The operating cost per passenger is higher with 'buses than with electric-cars, but in spite of this handicap the 'bus is, in some cases, more economical for handling light traffic.

"4. The public interest requires that the electric-railways should be the sole passen-

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ger transportation agencies in their respective communities; this makes for the cheapest transportation for the public; it also involves the duty of studying all available transportation methods.

"5. Development of railless transportation by electric railways, if intelligently carried out, should not adversely affect the railways financially.

"6. While a demand for a more expensive service for certain parts of the larger cities may be filled by the use of 'buses, their principal function is, and will be, as adjuncts to electric-railway service.

"7. Believing that railless transportation contains interesting possibilities for the electric-railway industry, the further study of the subject by a committee of the association is recommended."

The committee was composed of the following: H. B. Flower, chairman; J. N. Shannahan, R. E. Danforth, D. W. Pontius, H. A. Mullett, C. W. Kellogg, W. J. Flickinger, H. B. Potter, S. W. Greenland, R. V. Miller.

Road Builders' Convention

With the early start that was made during the summer through a partial reorganization and an election of officers in the American Road Builders' Association and the creation of the Highway Industries Exhibitors' Association to bring about closer coöperation, arrangements are rapidly being perfected for the Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show to be held in Chicago, January 15 to 19, 1923.

The early beginning has enabled those in charge to perfect a working organization so harmonious and effective that conditions nearly perfect are assured for the next big double event. While many of the most important features of both congress and show will be retained, others both new and unusual, will be added.

It is the intention to separate the congress and show by holding the former at the Congress Hotel and the latter as usual at the Coliseum. It is believed this arrangement will be more satisfactory as it will obviate the necessity of shutting down the operating machinery during the sessions and will eliminate the noise that has proved so annoying to speakers and delegates at the convention. The new arrangement is also expected to increase the attendance at each session of the congress.

The program for the congress, as it is being worked out by the program committee, will be the exact reversal of previous ones. Instead of avoiding controversial subjects as in the past, the program next year will be made up almost entirely of controversial subjects of interest to the road-building industry as a whole. This should greatly increase the interest in the program and will provoke highly interesting and instructive oral discussions from the floor.

The American Road Builders' Association has opened new offices at 37 West 39th street, New York City. Headquarters will also be opened in Chicago long in advance of the congress and show.

Elimination of Traffic Hazards in Highway Improvement

By ARTHUR H. BLANCHARD

Professor of Highway Engineering and Highway Transportation, University of Michigan

AN INTIMATE relationship exists between the elimination of traffic hazards and the efficient design, construction and maintenance of highways. A momentous responsibility rests on federal, state, county and municipal highway engineers constantly to realize the public duty which is imposed upon them to safeguard to the maximum extent the life and property of persons using highways.

In the field of municipal highway improvements, more attention should be concentrated on methods to relieve congestion of traffic on city streets. The construction of ample widths of roadways, arterial diagonal streets and circumferential streets will materially assist in the relief of congestion of main traffic and business streets in many cities. State and municipal highway officials should coöperate in the routing of through traffic around the business sections of large cities and even outside the limits of small municipalities. Marked relief from traffic congestion has resulted wherever this fundamental principle of city- and town-planning has been adopted. A detail of street construction, often overlooked in many municipalities, which materially aids in the safe use of streets, is the construction by which the tendency of motor vehicles, in turning right-hand corners, to encroach upon the left-hand side of the roadway is materially reduced. State and county highway engineers may by proper highway design, construction and maintenance eliminate or measurably reduce many traffic hazards.

Widths of roadways should be constructed which will allow the safe passage of all classes of vehicles utilizing a given highway. For a 2-lane state trunk highway, the paved width should not be less than 18 or 20 feet depending upon the traffic to which the highway will be subjected. Serious congestion is resulting on many trunk highways due to the temporary parking of motor vehicles undergoing repairs or stopping for brief intervals. These obstructions on the roadway may be obviated by the construction of 5 foot shoulders of sufficient strength to carry standing vehicles. Cases have been noted where five vehicles within a distance of one mile on a highway outside a municipality have been parked on the roadway undergoing repairs. The practice at night, especially in the case of a vehicle without a tail-light, constitutes a serious source of danger. On narrow roadways, 14 to 17 feet in width, the safety of the traveling public may be increased by the marking of a center line on the pavement surface. Where traffic demands a greater width than a 2-lane highway, the construction of a 4-lane highway of 36 to 40 feet in width is recommended. The construction of 3-lane highways should not be required as under no practicable traffic regulations is it feasible to safeguard travel on the center lane of travel.

Traffic hazards on curves may be materially reduced by constructing the curves with a long radius, banking the roadway of the curves, constructing an extra width of the pavement on the inside of the curves, marking a center line on the pavements and eliminating obstructions to view on the inside of the curves. Right angle corners within distances of each other of less than 500 feet exist in many localities. They may be classified as ultra-dangerous traffic hazards and should be eliminated by the construction of a long double reverse curve in place of the two sharp curves on level stretches of highways. The tendency of many drivers to travel in the center of the roadway when not approaching traffic is observed has caused many accidents at crests. A center line marked on the pavement over the crest materially reduces this traffic hazard. It is believed that the expense of placing danger signs, calling attention to this hazard, on the sides of the roadways approaching all dangerous crests would be justified.

Railroad grade-crossings are a constant source of accidents. It is evident that their total elimination is desirable, but unfortunately is not practicable in all cases in the present state of the financing of highway improvements. Much can be done by proper design to reduce traffic hazards in the case of railroads crossing highways at grade. A clear sight of the railroad crossing for 500 feet on each side should be provided and a clear sight of the railroad for a 1,000 feet on each side of the highway is desirable. The width of all roadways crossing railroads should be at least 20 feet. For a distance of 100 feet on each side of the railroad, the grade of the highway should be level or not over 2 feet rise or fall in 100 feet. The suggestion by some officials to construct humps in the highway to slow down traffic approaching railroad crossing is unreservedly characterized as pernicious. It is self-evident that the number of accidents due to traffic hazards may be materially reduced by proper danger signs located at 500 feet from grade crossings, curves, hill crests and important road intersections.

The field of highway maintenance provides many opportunities for reducing traffic hazards. Methods should be employed which will reduce obstructions to traffic to a minimum. Only one specific type of roadway will be mentioned in connection with maintenance. Gravel roads abound in the middle west. Their use is attended by many accidents which may be materially reduced by proper maintenance. An excessive use of loose gravel has been the cause of many accidents, while the traffic hazard of dense clouds of dust is apparent to all who travel gravel roads which have not been so maintained as to eliminate or materially reduce the dust nuisance.

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Good Prospects in South

The chief impediments to progress have been at least partially removed; prospects for general business expansion in the south are good. Settlement of the labor controversies on the railroads, in the cotton mills and the coal fields, putting a million men back to work, higher wages in some industries and excellent harvests have given the people an increased purchasing power. This is the opinion advanced by Frank H. Gibbes, president of the Gibbes Machinery Company, of Columbia, South Carolina.

"This will make particularly heavy demands on local transportation facilities," Mr. Gibbes further pointed out. "Shippers in the South should, therefore, exercise the utmost care in the selection of their hauling units to be sure that they are able to despatch their goods with promptness and economy. I venture to say that in the majority of cases it will be found that the motor truck is the most valuable unit available for short-haul distribution. The fact that a million of them are in use to-day is proof.

"One particular large shipper that I know of stated that the reasons for this pronounced preference for the truck were that larger loads could be carried by trucks the combined loading and unloading time per unit was far less than for the number of horse-drawn vehicles required to handle the same load, and that less running time was necessary to handle the same amount of material. The American Railway Express, probably the largest user of local transportation units in this country, has found that increase ecenomy, larger volume of business and greater satisfaction result from truck use and that the truck is not affected by weather or road conditions. I am told that the Post-Office Department at Washington, after seven years experience with motor vehicles, has come to the conclusion that they have many advantages over horse-drawn equipment, even where the distance to be traveled is short. In one city alone $30,000 was saved by the motorization of a portion of the letter-box collections and parcel-post delivery services."

Firestone Profits May Be $8,000,000

The Firestone Tire & Rubber Company, which closes its fiscal year October 31, will probably show net profits of between $7,000,000 and $8,000,000. For the first eight months net profits were $5,000,000, according to President Firestone.

This showing will compare favorably with previous years. Profits, dividends and surpluses for the year since 1917 follow:

	Profits.	Dividends.	Surplus.
1921	$ 949,354	$1,843,542	*$19,010,115
1920	9,396,912	4,822,069	*1,549,782
1919	9,306,978	2,597,787	5,397,272
1918	8,356,230	2,610,000	3,910,442
1917	5,051,798	1,735,403	3,316,395

*Deficit.

The company started the year with inventory at $12,534,369, reduced from $45,163,710 as of October 31, 1920. Current assets were $34,000,000, against current liabilities of approximately $23,000,000, of which $21,000,000 were in notes, regarding which there has been much discussion. The report gained currency from time to time that the company had planned to refund them into long time securities.

Production went above 23,000 tires a day early in the year and reached a peak of 28,000, from which it has receded slightly to 26,000, where it has remained.

During the year the company placed a new tire subsidiary at Hamilton, Ontario, into operation with an initial capacity of 1,500 tires a day and provisions for doubling this as soon as the demand increased. Firestone does a large Ford tire business and the increase in production planned by Ford following the reduction in price, will probably result in one of the Firestone plants being operated at capacity. The rim plant, which the company planned to enter three months ago, is still idle, although indications point to its occupancy in the near future.

Because inventory losses of more than $16,000,000 were taken last year, it is doubted if further losses will be shown in the forthcoming statement.

Parts Sales to Date

Reports from members of the Motor & Accessory Manufacturers' Association show that sales in September, 1922, decreased 13 36 per cent. below the preceding month, August, and that for the first nine months of this year the total sales amounted to $308,855,420, or $116,216,675 more than for the corresponding period of 1921.

The following table shows the sales by members of the association, the total past-due accounts and the total of notes held for all the months of 1921 and the first nine months of 1922:

1921.	Sales.	Per Cent. Change.	Past Due.	Per Cent. Change.	Notes Outstanding.	Per cent. Change.
January	$ 6,264,587	.....	$8,099,727	.....	$4,359,871	.....
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,069,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Inc.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.05 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.05 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5.00 Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc.	2,217,670	4.49 Dec.
August	43,700,000	5.00 Inc.	3,705,000	8.21 Inc.	2,398,350	8.15 Inc.
September	37,300,050	13.36 Dec.	4,220,400	13.91 Inc.	2,658,800	10.86 Inc.

Thomart in East

Distribution of the Thomart truck for the entire eastern portion of the United States has been taken over by Eastern Thomart, Inc., 90-92 Bigelow Street, Newark, New Jersey. The new company is headed by William G. Toland, former vice-president of sales for Hare's Motors. Mr. Toland has taken with him several of his former Hare's Motors and Packard associates; W. S. Hill, vice-president, was formerly special representative for the Hare organization; William J. Foster, secretary and treasurer, was transportation engineer for both Hare's Motors and the Packard Motor Car Company of New York; William Carl Chapman, advertising and sales promotion manager, was former advertising manager for Hare's Motors and previous to that was advertising manager for the Packard Motors Export Corporation.

The new company controls the distribution of the Thomart truck in all New England, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia and West Virginia. Dealers have been established at New York, Syracuse, Rochester, Hornell, Newburg in New York; Newark, Bridgeton, South Amboy, Jersey City, Bayonne and West New York in New Jersey; Hartford in Connecticut, and Philadelphia, Erie, Sharon and Beaver Falls in Pennsylvania. This includes the Newark retail branch under the management of W. J. Foster, where a large parts depot is maintained.

Highways and Accidents

"With the constantly growing volume of traffic on our highways and the corresponding increase in accidents the question of highway safety, although considered important in the past by highway officials, is worthy of even greater consideration," states Thomas H. MacDonald, chief of the Bureau of Public Roads of the United States Department of Agriculture. "A very large proportion of the accidents can be eliminated by safe and sane driving, but they can be reduced to a minimum only by a combination of careful driving and the elimination of dangerous grades and curves, narrow roadways and bridges and the deadly grade crossing. In federal-aid construction, in coöperation with the states, much has been done along these lines and every step has had the support of the public, particularly in the matter of grade crossing elimination.

"In the State of Maryland the patrolmen are required to report to the state highway department the location and cause of every accident that occurs on the state roads. The information acquired in this way is used by the department as a guide in the planning of improvements which will reduce the accident hazard. When numerous accidents are found to occur at any point the dangerous feature is eliminated even at considerable expense.

"All over the country there are points on the highways which were compartively safe for the traffic of a few years ago, but which are now the cause of many accidents. The dangerous conditions at these points must be eliminated and each state highway department should have data available so that the elimination of the most dangerous ones can be undertaken first."

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Regulation of Motor Carriers

By GEORGE J. OBERHOLTZER
Secretary, Philadelphia Team and Motor Truck Owners' Association, Philadelphia

THE question of the operation of commercial motor vehicles over the highways has reached the point where its regulation and control have become a matter of public concern. Automobiles developed a public interest in highway improvements. Motor trucks brought to highway engineers and public officials a new problem.

During the war the highways assumed the burden of transportation which the rail carriers were inadequate to handle. Highway engineers appeared to be unprepared to plan highways to carry the present normal travel. The states arbitrarily and without any study or consideration of the proper unit of transportation have placed limits of weight and size on motor vehicles.

Motor vehicles have become the subject of legislation generally in all states and traffic rules have been adopted by the cities, towns and villages throughout the country.

In addition to these regulations the operator of commercial motor vehicles is subject to still further regulations. The general basis of this regulation is the public service or utility commission laws of the various states. While perhaps these laws are more generally applied to public operators of passenger vehicles in call and demand, taxicab and "jitney" service, yet it has been made to apply to a very considerable extent to operators of motor trucks as common carriers of freight. It is of necessity a matter of immediate interest to the owner of a vehicle engaged in public service to consider the attitude which he should assume with respect to regulation as such.

In looking squarely at the problem there are two phases to be considered, the one is the provisions of the laws as written and the other the policy of the various commissions applied in carrying out the provisions of the law. The laws themselves can not be so strenuously objected to. The courts, even before the advent of the motor truck, laid down the principle that he who holds himself out to carry indifferently for the public is a common carrier. In this class they included draymen. The real test is the intention of the owner. The evidence of the character of his business whether as private or common carrier is ascertained from the manner in which he appears before the public.

It must be admitted that he who solicits business of hauling freight or passengers, maintains an office for the attraction of such business is holding himself out to the public as a common carrier. From the point of view of the public it is perhaps now demanded that his business should be subject to some regulation by the public. From the point of view of the owner and operator it is also of advantage to be subject to public regulations.

This latter statement may appear to be a surrender of rights. But if they will consider the early development of the railroads with rate wars, rebates, free services, and ruinous competition they will bring to mind a picture not greatly unlike that of the conditions existing in numerous places as between public operators of vehicles in the carriage of passengers and freight.

Laws which permit development of the business in a constructive manner and yet afford protection against unfair and unsportsmanlike business tactics are of great benefit. Under them business, especially that of inter city transportation, could be stabilized and developed.

The policy of the commissions in interpreting the laws has not been as constructive and helpful as it could be. This, however is due largely to a point of view that has been developed through years of fostering the larger corporate utilities.

The only view that at first prevailed among public officials is that the motor vehicle on a public highway, operated for the public convenience, is an evil which should be carefully watched for fear that it might grow to too great importance.

There is lacking the study of the problem which should convince state officials that with the expenditure of millions of dollars of public money for highway construction the encouragement of motorized vehicles for service over them would result in return on the investment through the improved transportation brought to the sections served by such highways.

Through commission aid private capital would be induced to furnish the vehicles to carry passengers and freight for those whose travel or tonnage does not justify private ownership of such vehicles. The point of view must be emphasized that public highways are for the service of the public.

As now interpreted the laws encourage greater use of the highways for pleasure riding than they do for commercial utility. Or, in other words, the states are spending these great sums of money with the only encouraged purpose of making riding over them more pleasant, while frowning upon the use of highways for vehicles of burden.

The manner of regulation most commonly in force is that arising from authority of state commissions to require the issuance of certificates of public convenience as a condition precedent to the right to operate a vehicle for the service of the public. This certificate is acquired after due advertisement and notice to those holders of certificates for similar service and is granted only upon a showing that the service is necessary for the accommodation and convenience of the public. The certificate is usually granted for a specified period, at the expiration of which it must be renewed upon a showing that the necessity still exists for the service of the public. Upon the obtaining of the certificate the holder must comply with the rules and regulations applying to all public utilities, such as the filing of schedules of rates and practices as well as rules relating to operators of motor vehicles.

As qualification to receive a certificate some showing of the responsibility as protection to the public in the operation over the highways as well as to patrons against loss or damage to goods or passengers accepted for transportation. Further ability to supply additional units adequately to care for the service as the demand upon it increases must be established. In some states minimum insurance against public liability and injury to passengers and goods is required. Competency of owner to conduct and employees to operate the service is usually required to be established.

The certificate is generally limited to a specified route or territory and the holder is protected against harmful competition through refusal to grant another certificate until it is conclusively shown that there is over the route or in the territory a demand for service beyond that which the certificate holder has the ability to give. The theory of this policy is that to permit unlimited competition over the route would result eventually in the bankruptcy of all and injury to the public in being deprived of all service.

Those to whom the first statement, that regulation was not to be feared by the owner, was a severe shock may now begin to see the light. To illustrate: In most large centers owners for protection have banded together in a desire to stabilize and better the teaming and trucking business. Who of them, despite the efforts of their local association to keep the business clean and profitable, have not suffered from the intrusion into the business of some incompetent, irresponsible, price-slashing individual who by unfair practices and methods of competition has stolen business from them or caused them to cut their rates, to retain the business? Supposing that one have a utility law requiring the obtaining of a certificate to do business and that all the established members of his association had qualified under the law as common carriers and had filed their schedules of rates with the commission. No one could thereafter enter the business in his city without giving to each association member notice of application for a certificate.

Each one individually or the association on behalf of all the owners could appear and oppose the grant of an additional cer-

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tificate on the ground that the territory was already adequately served or that the applicant was not competent. The commission would undoubtedly welcome the assistance of the association in setting standards of qualification. Then, too, with the filing of schedules of rates the business would be protected against rate-cutting because it would be unlawful.

Nor could the customer force a reduction or a preference in rates any more than he could with the rail carrier. There are many who will say that it would be impossible to reduce rates to a definite schedule. The gas and electric companies said the same thing and they believed that they had quite as many different kinds of service to perform and as many customers to keep satisfied as truck operators think they have, but they have reduced their rates to definite schedules and classifications. To establish and maintain prices, and rates through truck owners' associtaions would be unlawful, but under utility laws it is their legal duty to fix and maintain as common carriers our rates.

Commissions are inclined to view transportation over the highway as directly competitive with rail and electric carriers. They have not come to the realization that this form of transportation is generally but a feeder and auxiliary to other forms of transportation. Without highway transportation the commerce of the country would not flow.

The matter of supervision under the powers of utility commissions has so far been exercised more largely in the matter of public carriers of passengers in motor vehicles. But in most states the power is just as great over freight carriers. A few complaints against excessive rates or abusive practices and a commission is apt over night to institute an investigation of all those engaged in the public hauling of goods.

Such complaints against taxicab rates and the dirty condition of the cabs caused the sending of commissioners to all the large cities of one state to commence an immediate investigation on the initiative of the commission itself. A decided change in the practices of taxicab operation was the result. It however also resulted in liverymen, undertakers, "jitneymen" and all manner of persons having to do with the hire of passenger vehicles being hauled before the commission and ordered to cease operation until they had obtained certificates to operate, and so placed themselves under the control of the commission where the law required them to be.

While at the present time the Interstate Commerce Act does not give jurisdiction over highway transportation there has been, for several sessions of congress, a smoldering effort to enact amendments to give such power. This may at any time burst forth.

Authorized increase in the capital stock of the Continenal Motors Corporation has been approved by stockholders of the organization. This brings the capital stock to 3,000,000 shares of no par value, of which 1,500,000 shares are to be exchanged for the present stock of $10 par vlaue.

Prizes Offered for Essays on Prevention of Accidents

N. A. C. C. AIDS EDUCATION BOARD

Aroused by the large number of accidents and fatalities attributed to motor mishaps, scores of cities and localities throughout the United States began the week of October 8 to 14 with the observance of "Seven Days for Safety," part of the "Safety Season" suggested by the Highway Education Board. According to the most reliable statistics, the board says, at least 12,500 persons were killed in motor accidents during 1921, while 350,000 persons received minor or major injuries during the same period. This death and accident toll, says the board, can be laid directly at the door of carelessness and ignorance. It is in an effort to correct this situation that the "Safety Season," with its component parts, is suggested.

One of the unfortunate features is the fact that accurate statistics of the number of accidents and deaths can not be had from all communities. The board's estimate is based on the best figures obtainable from the Bureau of the Census.

In the observance of the "Safety Season" in New York City, one of the outstanding activities is "Safety Week" under the direction of the Safety Institute of America, with Judge Elbert H. Gary at the head of its public safety committee. In New York the week was divided into special days and virtually the same procedure was followed in other cities.

One of the chief suggestions for the observance of the "Safety Season" and "Safety Week" is that in each city a Public Safety Executive Committee be appointed by the mayor, or other competent authority, which should be charged with the duty of carrying on the other activities of the "season." In this manner the safety campaign in each locality is thus entrusted to those who feel the greatest concern and responsibility for it. Among those suggested to serve on these committees are representatives from the police department, schools, chambers of commerce, mothers' and women's clubs, city clubs, civic organizations, Rotary clubs, Kiwanis clubs and kindred bodies.

Although the "Safety Season" was brought forward as a progress idea, the board in its announcements emphasizes that "the physchological value of stressing a principle during a certain fixed period, such as a week, should not be neglected."

Two features of the "Safety Season" are the national safety essay contest among children of elementary schools on the subject "My Share in Making the Highways Safe," and the national safety lesson contest among elementary school teachers, who are invited to submit practical safety lessons teaching children safe behavior on the highways. Announcements of these contests are being made from the office of the Highway Education Board, Willard Building, Washington, D. C., and from offices of state superintendents of public instruction.

To simulate interest $6,500 in prizese are being offered. These consist of three national prizes to pupils, the first of which is a gold watch and a trip to Washington. In addition on 478 state prizes, medals and checks, are offered pupils. All prizes are given by the National Automobile Chamber of Commerce.

Elementary school teachers who are asked to submit safety lessons are offered three national prizes, the first, a check for $500 and a trip to Washington. Second and third awards are $300 and $200 respectively. The contests are similar to those conducted by the board in 1921, in which 400,000 pupils and 50,000t teachers participated.

More Shipments by Water

The freight-car shortage is again stimulating shipment of automobiles by boat and driveaways as in the 1920 congestion. About 40,000 cars a month are going via boat or highway compared with 60,000 monthly average in the early part of 1920 and 75,000 at the peak of 1920 congestion.

Michigan Central is turning back around 125 cars a day gathered from New York Central connections at Buffalo and Suspension Bridge and from 15 to 25 a day gathered at Chicago. These are freight-cars with wide doors built for automobile shipping. Against this daily supply of approximately 150 the Detroit district is calling for 300 freight-cars a day.

Ten or 12 privately chartered boats loaded to the limit are making record shipments from Detroit to Duluth, Milwaukee, Chicago, Buffalo and Cleveland. Many will continue long after navigation officially closes, in fact until ice in the Mackinaw straits prevents western shipments and ice in Detroit river closes the Lake Erie route.

Continued absence of heavy snow on the highways will be the biggest boon to the manufacturer and driveaways will be continued throughout the winter if road conditions permit. At present available freight-cars are being used for the longest shipments, as to the Pacific Coast, the south and New England.

A member of the National Automobile Chamber of Commerce committee declares there is no intention to lessen operations as reported in a Washington newspaper. He said the committee asked the Interstate Commerce Commission to reinstate the rule providing for the return, loaded, of automobile freight-cars to Michigan, Wisconsin, Indiana, Ohio, and Illinois. This was done, he explains, to avoid a shutdown which seems certain if weather conditions prevent driveaways and boat shipments during the winter.

Taxi Service in Naples

Heretofore taxicabs have not been operated in the city of Naples, their place being taken by small horse-drawn cabs equipped with taximeters and a few motorcycles with side-cars. On December 1 a new service was begun with 20 cabs, to be increased to 100 in the near future. The machines are of Italian manufacture, cost about 20,000 lire each, and carry only two passengers. The fare is 2 lire for the first 500 meters and 2 lire per kilometer thereafter, with a flat supplementary charge of 50 centesimi.

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Coming Events

Nov. 9 and 10, 1922.—Des Moines, Ia. Convention of Iowa Automotive Merchants' Assn. A. J. Knapp, secretary, Shops Bldg., Des Moines.

Nov. 10 to Dec. 19, 1922.—Brussels, Belgium. Automobile show, Palais de la Cinquantenaire.

Nov. 13 to 18, 1922.—Chicago. Annual exhibit and convention of Automotive Equipment Assn. Coliseum.

Nov. 21 to 23, 1922.—Grand Rapids, Mich. Annual meet of Michigan State Good Roads Assn.

Nov. 22 to 29, 1922.—Cincinnati. Second annual automobile, accessory and radio show, auspices Cincinnati Automotive Trades Assn., Music Hall. Trucks, cars, tractors, accessories and radio equipment. John J. Behle, manager, 809 Gerke Bldg., Cincinnati.

Dec. 6 to 8, 1922.—Toledo, O. Sixth annual convention, Ohio Automotive Trades Assn. LaSalle-Koch assembly rooms. E. J. Shover, manager, 404 Central National Bank Bldg., Toledo.

Jan. 6 to 12, 1923.—New York City. Annual automobile show of National Automobile Chamber of Commerce, Grand Central Palace. Cars and accessories. S. A. Miles, manager, 46th St. and Madison Av., New York.

Jan. 8 to 13, 1923.—New York City. Second annual body-builders' show, auspices of Automobile Body-Builders' Assn. 12th Regiment Armory.

Jan. 13 to 22, 1923.—Oakland, Calif. Fifth annual show of Motor Car Dealers' Division of Alameda County Auto Trade Assn. Civic Auditorium. Trucks, cars, tractors and accessories. Robert W. Martland, manager, 407 Pacific Bldg., Oakland.

Jan. 13 to 24, 1923.—Brussels, Belgium. Sixteenth annual Automobile and Cycle Exposition. Palais de la Cinquantenaire.

Jan. 15, 1923.—Topeka, Kans. Convention of Automobile Trades Assn. of Kansas. Philip E. Zimmerman, Topeka.

Jan. 27 to Feb. 3, 1923.—Chicago. Annual automobile show of National Automobile Chamber of Commerce. Coliseum and First Regiment Armory. Cars and accessories. S. A. Miles, manager, 46th St. and Madison Av., New York City.

Feb., 1923.—Charlotte, N. C. Annual automobile show of Charlotte Automotive Trade Assn. Carolinas Exposition Bldg.

Feb., 1923.—Salt Lake City. Annual meeting of Intermountain Automotive Trades Assn. Carl L. Snow, manager, Salt Lake City.

Feb. 3 to 10, 1923.—Minneapolis. Sixteenth annual automobile show, auspices of Minneapolis Automobile Trade Assn. Trucks, cars, tractors and accessories. W. R. Wilmot, manager, 709 Andrus Bldg., Minneapolis.

Feb. 12 to 19, 1923.—Portland, Ore. Fourteenth annual show of Automobile Dealers' Assn. of Portland. Municipal Audtiorium. Trucks, cars, tractors and accessories. Ralph J. Stachli, 424 Henry Bldg., Portland.

Feb. 17 to 24, 1923.—St. Louis, Mo. Sixteenth annual show, auspices of St. Louis Automobile Dealers' Assn. Trucks, cars and accessories. Robert E. Lee, manager, 1324 Locust St., St. Louis.

Feb. 17 to 24, 1923.—Akron, O. Ninth annual show of Akron Automobile Exhibition Co. Central Garage. Trucks, cars, tractors and accessories. E. T. Jones, manager, 1091 W. Exchange Av., Akron.

Feb. 28 to Mar. 3, 1923.—Syracuse, N. Y. Fifteenth annual show. State Armory. Trucks, cars and accessories. Howard H. Smith, manager, 701 Eckel Bldg., Syracuse.

Mar. 3, 1923.—Quincy, Ill. Fourth annual convention of Illinois Automotive Trade Assn. F. C. Zilman, manager, 212 Lehlmann Bldg., Peoria, Ill.

Mar. 10 to 17, 1923.—Boston. Annual show, auspices Boston Automobile Dealers' Assn. Merchants' Bldg. Trucks, cars and accessories. Chester I. Campbell, manager.

Body Standardization Counts

Making over a badly wrecked delivery truck in only 2 hours and 15 minutes, recently avoided many days of expected service loss and saved $100 in expense for the Fame Laundry company of Indianapolis. This lightning reconstruction was made possible by the standardized stock parts and economical methods of the Martin-Parry Corporation, of Indianapolis, which built the laundry's truck bodies.

The truck had been sideswiped and overturned in a ditch while on its delivery rounds. When the wreck was righted and pulled out of the ditch, the laundry manager believed an entire new body would be necessary. He despaired of getting the truck back into service in less than two or three weeks. Its vestibule was entirely demolished, top crushed, trimmings torn off, fenders smashed, and it was thought the elaborate panel decorations, seal and monogram would have to be painted new on another body. A new body and this expensive painting, to maintain the laundry's pride in the attractive appearance of its delivery fleet, was expected to cost at least $150 and keep the truck out of service for many days.

The wreck was taken to the Martin-Parry factory, with instruction to rush the job, as the truck was badly needed. Just 2 hours and 15 minutes later, the laundry manager was told that the wreck had been completely repaired and was again ready for service.

Every part and piece of construction to make the wrecked truck new was on hand at the Martin-Parry factory, and skilled workers managed to save the painted panels of the wrecked car and refitted all the necessary new parts from regular stock in record time, at a total expense of only $50.

Wyoming's Roads Increase

The last seven years have been a period of great road development in the State of Wyoming, according to figures collected by the Bureau of Public Roads of the United States Department of Agriculture. From 1914 to 1921 the total road mileage increased from 14,797 to 46,528 miles. This is in strong contrast to the majority of states, which have made great progress in road improvement, but without any appreciable change in total mileage.

During the 7-year period the mileage of improved road has increased from 1,724 miles to 6,867. The mileage of road is classified as follows:

	Miles.
Unimproved	39,373
Graded and drained	6,715
Gravel, chert, shale	413
Hard-surfaced	27

In the state there is a total of 613 highway bridges.

An analysis of the figures collected by the bureau shows that there is one-half mile of road per square mile of area; that the annual road revenue is $55.32 per square mile, $116.25 per mile of road, and $27.82 per capita.

In 1921 the total road revenue, including federal-aid funds, amounted to approximately $5,408,000, and expenditures $4,725,000. During the year 1,673 miles of improved road were completed in the state and considerable maintenance work done.

That federal-aid is playing a considerable part in road advancement in this state is shown by the fact that on August 31, 474 miles of federal-aid road had been completed, 421 miles were either under construction or approved for construction, and nearly $800,000 was available for new projects.

The state system of over 3,000 miles of road to be built with federal-aid and which will form a part of the Federal-aid highway system will be definitely settled upon within a short time.

Motors Help Population Spread

A nationwide investigation into the uses to which the motor vehicles put by its purchasers, conducted by the National Automobile Chamber of Commerce, discloses that in 135,000 instances in 60 cities throughout the country the motor car has been used as a vehicle for relief from high city rentals, the owners of this number of automobiles having moved from the city to the suburbs and depending solely upon their cars for transportation between their offices and homes.

Thus far the investigation is incomplete. The 60 cities from which reports have been received include only three of the chief cities of the country, Baltimore, Detroit and Cleveland. The figures do not include New York, Boston, Philadelphia, Chicago, San Francisco, St. Louis, Los Angeles or other cities of approximately their population. The combined population of the 60 reporting cities is less than 8,000,000.

If the same ratio is maintained throughout the rest of the United States, not less than 500,000 automobiles have been used during the past three years in the fight against high rents.

Baltimore and Detroit are tied for first place in the number of motor cars used primarily to carry workers to and from their work each day. In each case the number is approximately 25,000. Louisville is rated next, in returns compiled thus far, with 20,000. Oak Park, Illinois, and Cleveland are rated at 5,000 cars each; Toledo at 3,500; Tampa, Florida, Dayton, Ohio, Pasadena, and Casper Wyoming, at 3,000 each. Eight cities—Danville, Illinois, Waterloo, Iowa, Nashville, Winston-Salem, Tulsa, Houston, Tex., Richmond, Virginia, and Bellingham, Washington—are reported as having 2,000 cars each which have been devoted to this purpose.

49 Trucks in Bahamas

There are 91 motor vehicles in the Bahama Islands, of which 49 are trucks, all of American manufacture. The annual addition is about 12 trucks, and no effort can substantially increase these figures. Of the total population of 56,000, some 40,000 live in isolated islands, almost roadless, where there is neither money to buy nor roads to carry self-propelled vehicles.

The island of New Providence, with a coast road of less than 50 miles, contains the only town of importance in the archipelago—Nassau, with a population of 15,000. Machines are not stocked in Nassau but are ordered direct from the American manufacturer by the buyer or purchased in New York or in Miami, Florida. One company is represented by a local agent under special conditions, but limited prospects do not encourage exporters to seek agents nor Bahamas merchants to ask for agencies.

The duty on cars, trucks, and spare parts is 10 per cent. *ad valorem*. There is an annual registration fee of $25 for pleasure vehicles and of $5 for trucks. The fee for a license to drive a truck or car is $5 per annum. There is no duty on catalogues or on printed advertising matter, and packing should be as for a transatlantic or transcontinental shipment.

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180,000 Miles of Highway Will Be Built in 20 Years

$3,000,000,000 WILL BE THE TOTAL COST

Fifteen to twenty years of building good roads lie ahead of the United States. Under the program which the country has adopted there will be built, during that time 180,000 miles of improved highways which will constitute the federal-aid highway system and an equal or greater mileage of state and local roads. When the great job is done, the transportation facilities of the country will far exceed those of any other nation, past or present, in the world. The highways of the ancient Romans, whose fame has come down through the centuries, will pale by comparison.

Details of this vast road-building program were placed before the Highway Education Board at its conference in Washington October 26 to 28 inclusive, by state highway engineers and officials of the Bureau of Public Roads, United States Department of Agriculture, to whom has been entrusted the work of planning and supervising the construction of federal-aid highways. The plan was presented to enable the board to proceed authoritatively with its work of devising aids for schools and colleges to which road-builders of the country are turning for competent highway engineers.

Officials of the bureau place the aggregate cost of the federal-aid program alone at about $3,000,000,000, spread over the 20-year period. They base this estimate on an average cost of $17,000 per mile. The average cost, in turn, takes into consideration all classes of improved roadways from the cheapest to the most expensive types. Approximately one-third of the proposed system, or 60,000 miles of improved highways, already are either built or building.

The program is a new one. Up to comparatively recent years, road-building in the United States had been conducted without special regard to a national system. Highways had been constructed where needed without considering whether they would link up in the most effective manner with the whole network of roads to be spread over the nation. Engineers had sought more to meet immediate and local demands than the broader requirements of the states and nation.

The present federal-aid road-building program, officials of the bureau state, will contemplate the construction of only such roads as fit into the national program and contribute to the national system. At the same time the roads will be so selected as to serve the most important local requirements. With marked modifications the system adopted in building the railways of the country will be borne in mind in the construction of the country's new highways. There will be main lines of highway communication between centers and thousands of miles of feeder roads, reaching back into the more sparsely settled regions and into the rich agricultural sections to tap areas whose population and products will flow over the new system.

New roads will be planned and built—thousands of miles of them—where they will fit in most advantageously with the entire program. The bureau is continuing its research work into most efficient methods of roadbuilding, including the character and wearing power of materials, resisting qualities of varying sub-soils, etc., and has amassed a considerable store of valuable information all of which will be available for the highway engineer of to-morrow, whom the board is seeking to have educated in practical and modern methods.

Instructions to Mail Drivers

The Chicago Post-Office is utilizing striking placards in its effort to reduce reckless driving on the part of the mail truck drivers, who have been the objects of much criticism in the past. Each placard, of which there are 50 varieties, measures 11 by 14 inches, and a new one is placed on each truck daily in a position where it is always visible to the driver. Some of the messages follow:

"Uncle Sam expects every man to do his duty and cheerfully obey all rules and official orders and notices. Don't disappoint him!"

"The public wants safety, not excuses."

"It is better to be careful than to be crippled or to cripple some other person. Safety first."

"For the sake of safety keep your mind on your work."

"Don't 'hug' traffic. Allow yourself plenty of room. Mail trucks can not be stopped 'on a nickel.'"

"Accidents. Are they 'tough luck' or just carelessness. Think it over."

"Rainy weather and wet slippery streets mean extra careful driving. Keep out of car tracks as much as possible."

"Better to be slightly delayed than to cause an accident. Slow up at crossings, particularly at those near schools and railway stations."

"Go slow and sound horn when turning corners, passing children at play, driving near schools, and passing other slow moving vehicles."

"Don't follow other vehicles too closely. The more room you have the better, especially when streets are wet or slippery."

"Be careful when nearing corners. Think of the other fellow."

"The exercise of care to prevent accidents is a duty which you owe to yourself and your fellow man."

Where Lubricating-Oil Goes

According to Joseph E. Pogue motor vehicles of all kinds consume 26 per cent. of the lubricating-oils produced in the United States, 36 per cent. being used by industries, only 5 per cent. by railways, and the remainder sent abroad. Of the total amount consumed in this country motor vehicles use 38 per cent. (10 per cent. by motor trucks, 26½ per cent. by passenger cars, and 1½ per cent. by farm tractors), industries 53 per cent., and railways 9 per cent. In other words, motor vehicles of all kinds use nearly three times as much lubricating-oil as our railways and nearly three-quarters as much as all manufacturing industries.

Big Development of Motor Coaching Seen by Carter

EXPECTS 1,000 CARS IN SERVICE SOON

"This is your opportunity," said Lenas W. Carter, representative of the White Company, in addressing the railway men assembled at the recent convention of the American Electric Railway Association at Chicago. "In your own organization operations are now under way by the Pennsylvania-Ohio Electric Railway Company, where they are operating 20 'buses, and the operation of the Milwaukee Electric Traction Company with 70 'buses, and in the operation of the Baltimore company, with 60 to 70 'buses, to say nothing of the fact that there are at present 60 electric railway organizations in the United States operating 'buses. This is of itself proof that now is the opportune time for electric railway interests to enter the motor 'bus and motor coach field.

"However, your opportunity is in immediately initiating that form of transportation system proving tremendously profitable in Youngstown, Ohio, and Milwaukee, Wisconsin, known as motor coach transportation. These two electric companies have visualized a new potentiality in passenger transportation—catering to the demand of the masses and meeting the psychology of the situation by offering a luxurious service at a luxury price to serve where neither the electric or steam railroads now go and motor 'buses not yet serving.

"I want you to visualize a new passenger traffic opportunity to the public, which offers a suitable service to the motor car owner who does not want to take his car down town, or to the wife of a motor car owner who does not care to drive a car in the dense traffic and who still wants comfort in her travels about the city. I want to predict here that within a year there will be 1000 of this type 'bus in use."

Demand for Trucks in Borneo

The British Chamber of Commerce for the Netherlands East Endies reports that, as a result of the rapid development of Northeast Borneo, the volume of freight is growing. Several good roads have been constructed and the projected railway from Pontianak to Sambas will afford very much needed transport facilities. The market, actual and potential, for motor trucks is particularly worthy of exploitation, and it is stated that there is an ever-present demand in Northwest Borneo for the 3- to 5-ton type of vehicle. The projected railway can hardly absorb all the traffic which now uses the roads, and the estates will require transport for their produce to the nearest railway. The making of good roads and the facilities with which motor trucks can handle plantation produce have already led to a rapid increase in the number of such vehicles used.

During September 825 trucks were registered in the State of Nebraska, as well as 38 trailers.

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Saves Over Half of Cost of Cleaning Catch-Basins

REFUSE REMOVED AT $3.00 PER BASIN

In the city of Perth Amboy, New Jersey, according to the street commissioner, it costs, on an average, $6.96 per basin to clean sewers by the usual method of hand labor and teams. But P. J. Healey of New York City has designed a machine which in the same city does the work for $3.00 per basin. The machine consists of a 2½-ton truck on which is mounted a specially designed dumping body which may be removed, allowing the rtuck to be used for other purposes. On the truck platform is a mast and boom, the mast resting on ball-bearings so that the boom may be swung directly over the catch-basin. A grab-bucket, operated by power-driven drums using two cabbs, one for hoisting and lowering the bucket and the other for opening and closing it, is carried by the boom. The power is taken from the truck engine. A pole is used to direct the bucket, making it possible to clean the entire circumference of the catch-basin without sending a man below the surface. The dump body on the device can be used as a container and may be dumped directly into another truck, so that, while the second truck is taking its load to the dumping point or scow, the container on the machine can be reloaded, ready to be discharged into the empty truck on its return.

The operation of the truck in conjunction with the cleaner prevents loss of time. The cleaning machine may be continually operated, proceeding from one catch-basin or sump to another, or to any place from which it is desirable to remove deposits, and without the loss of time which would be experienced were the machine itself sent to the dump. The grab-bucket, which is of the orange-peel type, has a large capacity, making the operation of the machine very rapid.

A series of tests made by A. F. Munoz, street commissioner of Perth Amboy, demonstrated that catch-basins can be thoroughly cleaned in 20 to 30 minutes with this truck and 2 men. As stated before, the cost is reduced over 50 per cent.

Mr. Healey's machine has received the hearty approval of all municipal authorities who have seen it in operation. Easy to handle, thoroughly efficient and reliable, the machine will soon pay for itself in the saving effected. The truck used is a 2½-ton Selden.

Rubber Inventory Appreciates

The United States Rubber Company is in a favorable raw material inventory position, but the actual benefits from the recent rise of nearly ten cents a pound in crude rubber are being unduly magnified, officials say.

It has been estimated that at current prices around 23 cents a pound United States Rubber has a paper profit of more than $5,000,000 on its crude rubber holdings. This is characterized as "entirely too high" by officials, who point out that, even if this were correct, it could not be reflected unless the rubber were actually sold at the higher prices. No benefit will accrue unless prices of finished rubber goods are advanced and then it will spread over the period unnecessary to work off the rubber.

Belief prevails in some quarters that as the price of crude rubber advances the rubber companies mark up their inventories of the commodity purchased at lower levels. United States Rubber will take no such step and it is unlikely that other manufacturers will do so.

At no time in the past two years has United States Rubber made any effort to purchase large quantities of raw material at a time. It has been its recent policy to commit itself on as short a position as is consistent with maintenance of adequate stocks. The management knew that none of its competitors were buying heavily at low prices and was content to stay in line with them.

With respect to crude rubber, however, United States Rubber has a decided advantage as the price rises, because it operates its own rubber plantations comprising about 80,000 acres in Sumatra. They are among the lowest cost producers of rubber and since they supply the company with a substantial part of its requirements the saving is considerable.

Road Dragging with Trucks

Though road dragging is strenuous work and is commonly considered a tractor job, many county highway departments have, as a result of high operating costs, found it necessary to cut expenses. So, instead of hiring tractors for their dragging, many are using their motor trucks for this purpose, and with entire satisfaction.

Douglas County, South Dakota, dragged 1,507 miles of road with an FWD 3-ton truck and a large drag during the summer months of 1921. The following figures show the comparative costs of doing the job with a truck and hiring it done with a tractor:

Miles dragged	1,507
Gallons of gasolene used	787
Gallons of oil used	42
Miles per gallon of gasolene	1.9
Miles per gallon of oil	35.8

(This work was all done in low gear, hence the low mileages.)

Cost Per Mile.	
Gasolene	$0.12
Oil	.02
Driver	.185
Repairs	.032
	$0.357
Cost per mile with hired tractors	1.25
Saving per mile by using trucks	$0.893

The total saving on this job was $1,345.75, an amount which this county could not afford to throw away. At such figures, highway officials find it decidedly to their advantage, where their trucks are of sufficiently sturdy construction, to use them for such work.

A line of trucks to be known as the Krebs-Collier will be built by the Collier Motor Truck Company for the Krebs Motor Truck Company. The capacity and prices of the new models follow: ¾-ton, $1,260; 1-ton, $1,565; 1½-ton, $2 125; 2½-ton, $2,375; 3½-ton, $2,975.

August Fuel Consumption Sets a New High Record

583,687,932 GALLONS USED IN MONTH

A new high record for consumption of gasolene in the United States was attained in the month of August, according to statistics compiled by the Federal Bureau of Mines, which show a domestic usage of 583,687,932 gallons. Consumption of gasolene in August was 3.1 per cent. greater than in July, in which month a record consumption mark had also been established. Consumption figures for this August represent an increase of 16 per cent. over the statistics for August 1921.

Production of gasolene during August amounted to 549,958,376 gallons. The figures represent a decrease of approximately 20,000,000 gallons, or 3.5 per cent. from the July output, which set a new monthly record for gasolene manufacture. Stocks of gasolene on hand September 1 amounted to 703,738,310 gallons, a decrease of 69,000,000 gallons during the month.

Exports of gasolene in August amounted to 35,747,004 gallons, a decrease of 23,000,000 gallons compared with July. Imports were 2,829,062 gallons, a decrease of about 2,000,000 gallons. Shipments to insular possessions were 2,523,141 gallons.

During August the daily average of 1,571,000 barrels of oil run through the stills of 295 refineries reported to the Bureau of Mines as operating shows a decrease of 1.38 per cent. in the amount of oil run and a decrease of 10, or 3.28 per cent., in the number of operating refineries as compared with July. Taking into consideration the greater decrease in the number of operating refineries, there is shown a relative increase of 1.96 per cent. in the amount of oil run.

The kerosene output in August amounted to 184,382,897 gallons, a decrease of 4.4 per cent. from the production for the previous month. Stocks of kerosene on hand September 1 were 285,520,131 gallons, a decrease of 12 per cent. Exports and shipments to insular possessions amounted to 87,316,297 gallons, an increase of 36,500,000 gallons over the July figures.

Motor Trade in Austria

All Austrian-made motor trucks are 4-cylinder, except the Steyr, which makes a 6-cylinder 2½-ton model. Other manufacturers are the Fross-Buessing, with a 3-ton model estimated at 8,000,000 crowns and a 5-ton model at about 10,000,000 crowns; the Fiat and Perl both make 4-ton trucks; Graf & Stift puts out a 5-ton; and the Sauer has two models, a 3-to-4-ton truck and a 5-to-6-ton.

Aside from cycle-cars for which no figures are available, much the largest manufacturers of motor vehicles in Austria are the Steyr, producing 3,800 passenger-cars and trucks annually, and the Daimler, with an annual output of 1,500 passenger-cars. Fiat produces 800, Graf & Swift 600, Puch 600, and Perl 200 passenger-cars and trucks annually, while the Fross-Buessing and Saurer each have a yearly output of 200 motor trucks.

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Low Hung High Speed Coach

Specialization in passenger vehicle design to suit varying traffic and road conditions has developed considerably during the past few years. As showing what can be done by a manufacturer to evolve a passenger-carrying vehicle to suit special requirements, a good example is afforded by a new single-decker built by the Fageol Company, of Oakland, California, for long-distance 'bus work in that state. Before considering the design of this particular vehicle, it is well to realize that in California, where the roads are singularly good, long-distance motor 'bus lines have been developed to a very large extent, and traffic and road conditions are such as to warrant road speeds of 40 miles per hour being achieved with suitable vehicles. The design of a 'bus for running under these conditions is naturally very different from anything heretofore carried out. The new vehicle is designed much more on the lines of a high speed long-distance coach than those of an omnibus.

The engine is a Hall-Scott of high efficiency design. It is a 4-cylinder, of 4½x5½ bore and stroke, and possesses the unusual feature for a heavy-duty engine of overhead valves, operated by an overhead camshaft. The design possesses many special features, one of these being the use of a silent chain to provide the fan drive, the overhead camshaft being driven by gears from the fan shaft. The power developed is 62 horse-power at 1,800 revolutions per minute, at which speed the governor comes into operation. High-pressure lubrication is employed, pump water circulation, and Delco ignition, starting and lighting. The 4-speed gearset is built in as a unit with the engine, the third speed being direct and the fourth over-geared.

The frame is dropped very low, in order to keep the whole body as near the ground as possible; to prevent any chance of whip in the long transmission shaft this is supported at two points in ball-bearings mounted on frame cross-members. The ball-bearings themselves are mounted in metal housings, are supported on fiber disks, which in turn are bolted to the cross-members, the result being that any noise or rattle is avoided. The wheelbase is 188 inches, and the track 68 inches. The springs are half-eliptic, underslung; brakes are both in the rear wheel drums; and steering is by worm-and-nut.

The whole body is built to come down outside the frame to the running boards, which are only 13 inches from the ground. On opening the doors, it is found that the board extends theree or four inches inside them, thus giving a wide step for entering into the body. The main floor within the body is only 19 inches from the ground, 54 inches is allowed for head room, and the height overall is just over 75 inches. Accommodation is provided for 27 passengers, although actually the body is described as a 20-seater, the space behind the rear axle being frequently used for luggage. In spite of the lowness of the floor line, it is not found necessary to insert a raise platform for the propeller-shaft. There is, however, a raised platform over the rear axle.

The general interior finish would be considered something between that of a typical 'bus and a coach. The floor is covered with linoleum, and the lower 8 inches of the sides with aluminium matting, above which polished timber is the finish. The ceiling is silvered, and all woodwork stained a French grey. The upholstery is of leather of a specially high quality and finish. Indirect lighting is arranged with dome lights, the light from which is reflected from the silvered top of the vehicle.

The main claims made for the vehicle are that it is essentially designed for its purpose, and in no sense is a modified truck. It is also stated that, being mounted on 6-inch pneumatic tires, it is easy for it to maintain high speeds up to 49 miles per hour on the level, and that its elaborate springing, combined with the pneumatic tires, makes for exceptionally comfortable riding at these high speeds; further, that its low build makes it very safe and stable.

'Buses for Mayo Patients

Rochester, Minnesota, is the location of the most famous surgical institution in America, if not in the world. From all over the earth sufferers come to the Mayo Brothers for surgical attention. Rochester is 90 miles from Minneapolis, and up until recently the only means of transportation has been either the local trains on the railroad or hired automobiles. To provide the privacy and ease of the former and to eliminate the necessity of a taxicab ride at either end, J. H. Maylone has established the DeLuxe Line, running from the Curtis Hotel in Minneapolis and the St. Paul Hotel in St. Paul to the Kahler and Zambrota Hotels in Rochester. While Mayo's Sanitarium is the chief attraction in Rochester, the DeLuxe Line also serves those traveling between the two points for other reasons.

The first of the 'buses recently placed in service is of the multiple limousine type, having five compartments, separated by glass partitions and provided with individual doors on each side. They are carried on large pneumatic-tired Mack 'bus chassis, the ease of riding being enhanced by unusually long springs and rubber shock insulators between the spring ends and the frame, thus eliminating the ordinary rigid spring shackles and substituting therefor blocks of live, resilient rubber.

Four of the five compartments are for passengers, the fifth being for the driver with one extra seat for a passenger. Three of the remaining compartments are exact duplicates, being provided with deeply-cushioned divan seats accommodating three passengers each. The last compartment is larger than the rest, having rotunda seating for 9, being used as a smoking compartment. Easy ingress and egress to each compartment are provided by the unsual width of the doors and by auxiliary steps carried by the running boards. Each compartment is equipped with an effective ventilator on each side which can be controlled by the passengers to just the amount of fresh air desired, without affecting the ventilation of the other compartments. Similarly the heating system is individual, each compartment being provided with a register in the floor which communicates with an air jacket about the exhaust pipe. Each register can be controlled independently. Windows throughout are of heavy plate glass and can be opened by the passengers by means of the same crank type of regulator as used in limousines.

The body is enameled a deep blue, with chassis painting to harmonize. All seats, except those in the smoking compartment, are upholstered in gray striped velour laid over genuine leather, the ceiling, window posts and carpet seat backs being finished in harmonious material. The smoking compartment is upholstered in gray leather. The cushions are provided with compound springs and real curled-hair padding. A large baggage rack is provided on the rear portion of the roof, having a wire mesh railing and leather-covered steel straps, extending from front to back to hold the baggage down snugly. A tarpaulin cover fastens down firmly over this to protect it from dust. This upper deck is reached by a ladder at the rear-most portion of the right side. Space for hand baggage is provided under the rear seat, a locked door at the rear permitting it to be reached.

The present 'bus makes one round trip each day, the roads being good gravel, straight and level. The trip requires 4½ hours and is made on fixed schedule. The fare is $5.00 each way, only a few cents more than the regular first-class railroad fare. All seats are numbered and reserved in advance, so that the first purchasers of tickets are assured of their choice of seats, and no jostling to secure the best seats takes place. An unusual feature of the service is that each ticket carries complete casualty insurance, the ticket being divided by perforations. On boarding the 'bus the passenger surrenders half of the ticket to the operator and retains the other half as an insurance policy.

The chassis, while a regular Mack 'bus type, of 216-inch wheel-base, is specially equipped for this service. It is provided with the Mack special 'bus engine, 4 by 5, producing 35 horse-power at its maximum speed of 1450 revolutions per minute, as limited by the governor. The wheels are Dayton steel wheels, provided with demountable rims. Tires are Goodyear rut-proof type, 36 by 6 front and 40 by 8 rear. One spare of each size is carried under the floor at the rear. Hub caps are nickel-plated and the radiator enameled to match the painting. The radiator cap has a pair of eagle's wings and a motormeter and the fenders are of special close-fitting type. The usual headlights are replaced with a pair of the drum type. The interior of the body is provided with limousine-type flush lights throughout. In addition to the usual side lights, there are two tail-lights set in the body near the roof, and two green marker lights high at the side of the windshield. The latter are designed to distinguish the 'bus at night. At the left side of the driver is a signaling device consisting of a nickel-plated arm carrying a red arrow-head at its end. This arrow-head is illuminated at night. In addition there are two stop signals at each side at the rear, operated by the foot brake.

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Motors in Road Construction

By R. C. SCHOEN
Highway Contractor, Ortonville, Minnesota

THIS paper on practical road construction is presented from the viewpoint of an engineer who entered the field as a contractor in that line. It includes some of the impressions acquired during 3 years of experience in the operation of outfits on such work.

Camp equipment must be the first consideration in the organization of a practical and efficient road-building outfit in which tractors are to be the chief power. Highway-construction conditions are very different from those surrounding railroad construction. There are transportation advantages in railroad work, especially on reconstruction, that do not appear in road work. A road job may be, and probably is, located several miles from a railroad. This means an overland move. In all likelihood the next road job will be located several miles distant, perhaps on another line of railroad; so one can not afford to ship an outfit a long distance, especially when the tariff is high. Therefore, the mobility of the outfit must be one of the chief considerations. The units must be handled easily and arranged for coupling into a train. Tents for horses and men were much used formerly, but these are high-priced and are quickly destroyed, especially in the prairie country where the wind blows almost continually. I have not used tents in the last two years. The men are housed and fed in cars. These are generally about 12x24 feet in size, built fairly light and well braced. The cars are mounted substantially on separate trucks and, when placed in a train for moving, are hooked to a heavy cable which runs underneath the entire string. No strain due to pulling one car by another is placed on the individual vehicles.

Up to the present, I have not motorized the earth-hauling equipment. Tractors are used only on the graders; horses on the wagons. Horses, of course, need barns. The designing of barns that could be easily moved presented one of our greatest difficulties. During the first two seasons we used sectional barns mounted on skids. On short moves a tractor would drag these barns, one at a time, to the new location, straining them badly in the process. On long moves they were knocked down, having been built in sections which could be handled by four men. They were then reassembled and set up at the new location. This method was unsatisfactory and the buildings were practically useless after one season.

We then designed a barn that could be mounted on wheels and have since made one that I consider thoroughly satisfactory. I now have barns mounted on wheels that can be prepared for movement in 10 minutes; they can be reset almost as quickly. These barns are 26x32 feet in size and can accommodate 12 horses comfortably. A half section of the roof on either side is made to drop down. This makes the width while moving less than 12 feet and avoids obstructing the highway; it also permits loading and shipping on flat cars if so desired. They can be coupled together and placed in a tractor train, one being hitched to another, without danger of being pulled apart. Thus every building on the camp can be placed in a train behind the tractor and moved at one time, leaving the lighter equipment and odds and ends to be brought up by the horses. Last season with such an outfit I made one move of 32 miles in one day. Later, I made two moves of 24 miles each in one day and experienced no trouble. The same outfit could not have been moved in the same time by horses.

During the last season I was well situated for making a comparison in the operation of outfits handled by tractor and by horses, having one outfit that was handled each way. These outfits were operating in the same district all summer and, for a time, they were on the same job, so that the soil conditions were identical.

DAILY OPERATING COST OF TRACTOR AND HORSE-DRAWN OUTFITS.

Tractor Outfit.

Operator, at $175 per month and board	$ 8.75
Gasolene, 28 gallons at 23 cents per gallon	6.45
Crankcase and transmission oil, 2 gallons at $1 per gallon	2.00
Track oil, 3 gallons at 20 cents per gallon	0.60
Track-roller grease	0.20
Interest on investment	3.00
Repairs for season, including overhaul	4.00
Total	$25.00
Depreciation, subject to question	15.00
Total	$40.00

Horse-Drawn Outfit.

Rental, 8 teams at $35 per month	$10.80
Hay and feed	16.60
Machine driver	6.00
Gig driver	4.00
Push driver	4.00
Extra pay for wheel-stock man	1.00
Harness repairs	2.50
Horseshoeing	1.10
Veterinary charges and medicine	0.50
Total	$16.50

Aside from this one job, the tractor had the most difficult work; in one place the soil was very sandy and stony and in another it was heavy clay containing a large percentage of boulders. The month of June was extremely hot and dry and we were operating in the sand during that period. The wagons suffered severely here, because they sank deeply into the sand and were a heavy drag even when empty. The heat and dust made breathing difficult and there were times when the machines were enveloped in such a cloud of dust that they could not be seen a short distance away. Nevertheless the machines kept going and would have worked at maximum efficiency throughout, if the wagons could have stood up under the strain; but we were compelled to slow up. I have often thought that a smooth running, completely motorized outfit would have finished this job in one-third the time.

On the two jobs mentioned, we encountered many boulders deeply embedded in the soil. Some of these boulders weighed several tons and, without adequate power on the job, it would have been necessary to break them with explosives in order to handle them. They were nearly all removed by the tractor by the simple process of digging around them putting on a heavy chain and "snaking" them out of the way. Boulders which could not possibly have been handled by horses were thus removed with a minimum loss of time.

On one of the jobs the road passed through a small lake which was about 1200 feet wide. The water reached a depth of 10 feet or more for a large part of that distance. A special bulldozer was designed and built to push the material ahead. This contrivance had a blade or pusher 8 feet wide, was heavily built and performed its work well, with four heavy horses for power; but, in my opinion, a small tractor would have been better in such a case than horses and I would like to see a practical machine built for use with a small track-laying tractor.

The soil on the job where the horse-drawn outfit and the tractor both worked at the same time was a heavy gumbo. The cuts were light and much of the material was taken from the sides and hauled long distances. Here I had a chance to make a comparison of performance, and that comparison was very favorable to the tractor. On this class of work, which consisted of a series of short cuts and long light embankments, turning the machine was an important item. On several occasions, I found that the average time consumed, from the time the plow was raised until it was set in the furrow ready to go, was 45 seconds for the tractor and 1.5 minutes for the horse-drawn machine. This means something throughout a season's run. There is also a marked saving of time in starting to work. For instance, one day I held the watch on the tractor when the machine was working about 800 feet from camp. From the time the foreman called "hitch up" until the first wagon was loaded just 10 minutes elapsed; with the horse-drawn machine, under similar conditions but with about 100 feet farther to go, 18 minutes elapsed. This was a clear saving of 8 minutes. These items may sound small, but they are important when considered as a part of the daily saving over a period of seven months.

Another item that should not be overlooked when comparing tractor and horse-drawn outfits is road finishing. With the tractor outfit, we made a practice of blad-

[Read before the Society of Automotive Engineers.—Ed.]

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ing up the completed work after hours or occasionally on Sunday, though, generally speaking, I do not approve of Sunday work. For this purpose I used a heavy grader having a 10-foot blade. I have found from experience that a machine having a 10 to 12-foot blade is the only one that will finish a roadbed in heavy soil properly, and that such a machine must be drawn by a tractor. As stated, this work can be done after hours where a tractor is employed as a part of the regular equipment. It was our custom to rough in from 0.5 to 1 mile and then go out for 2 or 3 hours after supper and blade it down. By keeping up with the finishing in this way, the amount of sand-papering required at the completion of the job is minimized and the highway engineer and the traveling public are kept in good humor. With an all-horse outfit, the preliminary blading is done with a machine having a 7-foot blade and drawn by six horses, but a light machine of this kind can not do the work as well as the heavy machine. On the completion of a job by the horse-drawn outfit, it was always necessary to swing one of the tractors and a large blade grader over and do the final blading. This sometimes meant moving a tractor several miles, loss of time when it should have been working and loss of time in moving it back. Under present road specifications and system of inspection, a tractor for finishing is almost indispensable.

The cost of operation, given in No. 1 table, is of interest. It affords an opportunity for a comparison between tractor and horse-drawn outfits and also for the comparison of actual costs with the data furnished by the builder. It shows a difference in favor of the tractor outfit of $6.50. It states only the cost of power, as the remainder is practically the same, and the costs of operation differ very little.

In making comparisons between tractor and horse-drawn outfits, the winter expense should be considered also. If a contractor owns his stock and is fortunate enough to get into a lumber camp for the winter, all well and good; but, if such work is not offered, as has been the case this past winter, and he is compelled to winter the stock himself, he piles up a bill of expense that would not be incurred with a motorized outfit. Another item is the smaller expense of a motorized outfit when tied up by rainy weather. Last fall we had bad weather that lasted two weeks and could work only two days out of fourteen. The expense of the tractor outfit during that time was only slightly more than one-half that of the horse-drawn outfit.

There was a wide difference among operators in the manner of handling a tractor, but there is only one right way. I had two operators early in the season. One came well recommended and apparently knew his business; he remained about six weeks. Afterward I got a young man who was a real operator who reduced the daily gasolene consumption from 42 to 28 gallons. This, of course, reduced the consumption of oil and also was much easier on the engine.

There was, in my experience, very little difference between the daily output of the tractor and that of the horse-drawn outfit under similar conditions. Heretofore I have used the contractor size of elevator with a 36-inch carrier. Next season I am planning to use the heavier machine with the 40-inch carrier, as there is ample power to handle such machines. The best working gear for the 10-ton tractor is the low gear, but I have found this to be rather too slow a speed for ordinary work. In my opinion, 2 miles per hour on low gear would be about right. This is about the speed at which a machine is drawn by 16 heavy horses.

When starting to use the tractor with the elevator grading machine, I feared the grader would not withstand the strain of continually being stopped and started. I have found this fear to be groundless. The tractor starts the grading machine more easily than horses do, there being no lunge forward but an easy pull that throws no great strain on any particular part. Fewer repairs were required on the machine operating behind the tractor than when it was drawn by horses.

I can say very little on the subject of repairs for the tractor, as I have had this tractor but one season and the repairs have been comparatively light, consisting of small items such as valve-springs, gaskets, magneto parts and the like. Only one section of the track broke during the season and no pins were replaced. No delays whatever were caused by breakdowns but this, of course, should be true of any high-grade machine for the first season.

Although I have been discussing tractors of the track-laying type entirely, this does not mean that I am altogether ignoring the wheeled tractor. I have one large wheeled tractor that has been in operation for seven seasons. Last season it traveled a distance of 3,000 miles on work, which consisted of turnpiking township roads, heavy maintenance of state roads and finishing new work. The grader used had a 12-foot blade. This is good work for an old machine, but a comparison of costs between this tractor and the track-laying tractor can not be made consistently because the old machine naturally used much more gasolene and oil than the new one. The wheeled tractor worked in long stretches, which called for very little turning. I gave up trying to use this tractor on wagon work in short cuts where frequent turning is necessary, because too much time was lost; but, on long, straight-away work, I have found it very satisfactory.

I have been particular to use the best lubricants, obtainable, regardless of price, and have adhered strictly to the instructions of the builder in this respect, although salesmen wished to sell me oils at a much lower price that were said to be just as good as those I was using. Other oils may be as good as those the builder recommends but it seemed unwarranted to change to some other oil for the sake of saving a few dollars. As a result of persistently using the oils indicated I have had no bearing trouble. All parts of the machine are in excellent condition and the expense of overhauling after a full season's work will be very light. I have had the cylinders of the engine of the new tractor rebored and new pistons fitted. This would not have been necessary under ordinary conditions, but the excessive wear was due to the fact that we operated much of the time in fine sand, which worked in through the air-cleaner.

The records show that the actual cost of moving earth with the tractor outfit on wagon work during the past season averaged about 1.5 cent per cubic yard less than with the horse-drawn outfit. These figures are no doubt disappointing to those who expect the tractor to make a better comparative showing but the tractor outfit was operating largely on jobs where the machines could not work at their maximum efficiency at all times. Part of the time they worked in very loose dry sand, freely interspersed with boulders, while the horse-drawn outfit encountered very little rock during the entire season and was operating in soil that was ideal for an elevating grader. If the same outfits were placed on work where the soil conditions were the same, the actual cost of moving earth with a tractor outfit would be from 3 to 4 cents per cubic yard less than with the horse-drawn machine.

Motorization of earth-loading machinery has been accomplished. The next step is to motorize the earth-hauling equipment in such a way that material can be moved more cheaply. Much time and money have been spent but no machine thus far designed for this purpose seems entirely practicable. Gravel hauling has been revolutionized by the motor truck; so, why not apply mechanical power to the moving of earth?

Many grading contractors are prejudiced in favor of horses for all purposes. After two years in business I decided that it might be well to adopt the plan of trying anything once. I am satisfied thus far; so much that I shall add tractors to my outfits as fast as conditions will permit, being firmly convinced from experience that we are only beginning to realize the value of tractors on construction work.

New Motor 'Bus Services in China

The Shanghai-Taichong Long Distance Automobile Company of China inaugurated its services on January 1. The 'buses make runs at intervals of 1 hour each and operate 20 hours a day over a distance of 20 miles. The first-class fare is about 30 cents and second-class fare 10 cents (local currency).

The Shanghai Nanwei Company has been organized with a capital of $500,000 (silver). From a German firm in Shanghai it has ordered 8 'buses to seat 20 persons each. The distance to be covered by the run is about 24 miles. There is a possibility of motor trucks being ordered later, and this may offer an opportunity for American firms.

The Shanghai-Minhong-Nanshiao-Choling Automobile Transport Company (Ltd.), capitalized for $500,000 (silver), has ordered five 20-passenger 'buses from the same German company in Shanghai. The road from Shanghai to Minhong (20 miles) is now under construction, and the line is expected to be in operation in about five or six months. This company also will probably be in the market for motor trucks when the passenger service has been inaugurated.

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Asphaltic-Concrete Roads Give Satisfaction in West

By G. W. APPERSON

Field Engineer, Standard Oil Company of California

IT has been recently stated that there is now available in the United States $1,360,000,000 for street and highway construction. The sum, large as it is, represents an increase over the highway revenues of 1914 of only 150 per cent. while highway traffic has increased about 450 per cent. There are now about 2,500,000 miles of highways in the United States, of which only an approximate 100,000 miles are improved modern hard-surfaced pavements. One will readily grasp the immensity of the task of improving our highways. Particularly in our large western states is the job a difficult one, because of the large area of publicly-owned lands and the sparse populations in many localities.

The Standard Oil companies, realizing certain distinct advantages in the asphalt type of construction, have made a comprehensive study of pavement types and design and our study has brought to us the conviction that the asphaltic-concrete base and surface pavement meets, in every sense, the requirements of the modern roadway surface.

One type of asphaltic-concrete base and surface pavements is known as the "black base." The base is a coarse graded aggregate asphaltic-concrete, composed of a mechanical mixture of asphalt with broken stone, or gravel and sand. It is generally laid to a thickness of from 2½ to 4 inches, dependent upon subgrade conditions and weight and volume of traffic. Upon this base may be placed a surface of asphaltic-concrete, fine or coarse aggregate type. Fine aggregate surface is best exemplified by Topeka, the coarse by Warrenite. The surface is laid from 1½ to 2 inches in thickness. This type of construction should not be confused with asphalt-macadam, which is constructed by the penetration method, spraying hot asphalt into rock that has been placed upon the subgrade of a road and compressed with a roller. In the construction of asphaltic-concrete pavements the rock, or gravel and sand and asphalt are heated, combined in definite proportions and mixed at a central plant, one plant only being required for both base and surface

The load-carrying capacity of any type or design of highway must, of necessity, be influenced by the support afforded the pavement from below. Such support is furnished by that portion of the earth directly below the pavement, known as the subgrade. With very few exceptions any well compacted soil will, of itself, support the heaviest traffic, if its moisture content is properly controlled and if it is protected by a structure which prevents the displacement of surface particles. The protective structure, termed the "pavement," will then need to be only of sufficient thickness to afford such protection, and, at the same time, itself withstand the various destructive agencies of traffic. For a given traffic this thickness will depend largely upon the type of pavement used. It is evident that in many cases it will cost far more to increase the thickness of a pavement to such an extent that it will distribute the load sufficiently to enable a poor subgrade to support it, than it would cost to change natural subgrade conditions so as to create a high supporting value for a relatively thin pavement.

A comprehensive census recently compiled by the Standard Oil Company shows that to April 1 of this year there had been laid or contracted for in the five western states of Washington, Oregon, California, Nevada and Arizona 101,550,400 square feet of asphaltic-concrete base and surface pavement, this area being the equivalent of 1,070 miles of 18-foot roadway. Of this total, 86,257,613 square feet or 84.9 per cent. is 5 inches or less in thickness, demonstrating in no uncertain terms that the prevailing tendency is to construct this type to a total thickness of 5 inches or less. Pavements of this type were constructed 5 inches or less in thickness from fifteen to twenty years ago, and the fact that these pavements are giving satisfactory service under present traffic conditions lends us assurance that the thickness will be adequate for traffic needs of the future.

This belief is strengthened by a study of the problem from an engineering standpoint. As previously stated, any well-compacted subgrade in which the moisture content is properly controlled will, of itself, support the heaviest dead weight. By placing on this subgrade an asphaltic-concrete pavement impervious to water that will, from its resilient cushioning effect, withstand the pounding action of moving traffic, a successful pavement will be secured.

The census referred to showed that the first asphaltic-concrete base and surface pavement was laid on the West Coast in 1894. This pavement is on the main street of Visalia, California, and after 27 years of service, without a cent of maintenance cost, is in excellent condition. A large street-paving program is being carried out in Visalia this year and the type of construction is asphaltic concrete.

The California Highway Commission has recently called for bids for paving the Black Point Cutoff, in Marin County. Five-inch asphaltic-concrete was placed in competition with 5-inch reinforced cement concrete. The results of the bid have not yet been received. It is a fact worthy of note that the California Highway Commission is calling for bids on asphaltic-concrete pavement. The type is also being largely used in Oregon, the City of Portland alone having 770,000 yards of the type laid since 1910. Standard construction in the Oregon State Highway system is 5 inches of asphaltic-concrete. In this system approximately 250 miles of this type have been laid or contracted for.

Truck Liberates Imprisoned Mates

When the train men at Los Angeles, California, went on a strike some time ago, they tied up all the cars in the Los Angeles yard. Thousands of tons of fruit and perishable goods were lost every day because the men refused to move the cars to their destination or to the unloading station. This situation greatly increased the demand for motor trucks, for the railroad officials gave permission to the merchants to shift the cars around and pull those to be unloaded up to the station by motor trucks. The possibilities of this service were shown by the William L. Hughson Company, distributers of Federal trucks in Los Angeles. It happened that somewhere among the hundreds of cars was a car with four Federal trucks needed by the purchasers. The Santa Fe officials gave permission to shift the cars and a 5-tonner was sent to the yards. It shifted nine heavily loaded cars about and three hours after the job was started the four Federals were on their way to the service station. After this performance numerous trucks were put to work by the merchants as switch engines, undoubtedly resulting in a considerable saving to the railroad and to the produce men, particularly.

Demand for Motor Trucks in Syria

Motor trucks, especially those with a capacity of 2 or 3 tons, have proved effective competitors to wheel carts and railways for transportation of both passenger and merchandise, particularly over the mountain roads in Syria. While 250 trucks are now registered in the Damascus district, the demand for such vehicles still exists, though to a limited extent at present owing to the overstocked market and business depression.

Motor trucks are plying between Beirut and adjoining localities thus assuring regular service. In order to meet this competition, the railway company has decided to establish a motor transportation service for passengers and merchandise to run between Beirut and Damascus, 69 miles, also between Beirut and Sidon, 29 miles, and between Beirut and Tripoli, 56 miles. The motor vehicles have been ordered in France.

Prospects in Arabia

The trucks in Aden, Arabia, are practically all owned by one individual, who imports and operates them as 'buses and for the transportation of heavy merchandise. The general hauling is done by camel carts, which, although slow and limited to 1 ton, more or less satisfy the local needs for the present. American ½-ton trucks are quoted at 10,000 rupees ($3,200), while the Fiat and Berliet of 3 and 3½ tons are quoted at 18,000 rupees ($5.760). The market requires the heavier truck, as may be seen from the fact that 8 of the 13 trucks in use are of French make.

America has just entered the field for motor trucks, and as the country develops a heavy truck should find a good market. Aden is a free port and all nationalities have a fair field, and beyond a doubt competition will be strong in the future, even though American vehicles are in favor at present.

Canada gives employment to 15,000 skilled automobile mechanics.

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The Group Plan of Insuring Motor Trucks

By WILLIAM F. THEOBALT
Chairman, Insurance Committee, Merchant Truckmen's Bureau, New York

SOME time ago the Merchant Truckmen's Bureau of New York appointed at one of its regular meetings an insurance committee. The duties of this committee were to inquire into the motor vehicle insurance situation in New York City with a view to finding out if group insurance could be obtained for all the members in the organization, operating some 7,000 motor vehicles, as well as many horse-drawn trucks, and to obtain, if possible, lower insurance rates.

The committee made a most exhaustive investigation of the entire situation and concluded that group insurance could not be successfully applied to organizations whose members are engaged in the trucking business and who operate large fleets of motor trucks. It was believed that the bureau could not obtain for its members group insurance at lower rates than they now pay with the same measure of assurance that their vehicles would be properly covered.

The investigation brought out the fact that there is a great deal of premium juggling being done in New York despite recent state laws passed to prevent charges of other than standard rates on any policy. Truck owners not familiar with insurance practice believe that these cut-rate policies are valid and do not consider that they may some day be declared invalid by insurance officials who could take this stand on the technicality of refusing to settle because the rate was lower than that authorized by the state.

Though a score or more of brokers and insurance representatives submitted propositions on group insurance to the bureau, there were many others who came out openly and refused to do so. They even went so far as to declare that no matter what rates the organization got on group insurance, they could beat these rates in individual cases.

Truckmen are not going to patronize any group plan when they have the opportunity of obtaining lower rates than a group plan would provide. This, therefore, neutralizes the effectiveness of coördinated insurance.

Probably the most important factor which enters the group plan and which, at the same time, is the greatest detriment, is the fact that you can not discriminate against one truckman in favor of another under the plan. For example, the Merchant Truckmen's Bureau has some 600 members. If it were possible to obtain lower premiums for the organization as a unit than brokers secure individually, it would only be natural for every member to want this form of insurance. In every body of men, however, there are black sheep. Among the members there may be many who are extremely poor risks; who have gone through bankruptcy; have suffered huge losses of merchandise, *ad infinitum*. Are these men to be taken in with men who come under the preferred classification head? And if they are, isn't it a fact that these poor risks will have the tendency to make the organization's blanket experience rating higher?

A member of any organization who pays dues and is in good standing is entitled to all the benefits and privileges that make up being a member. Can an organization then consistently say, "You, Mr. Fleet Operator, have a very bad experience rating. We can not take you in under our group plan because you will make the organization's unified rating higher." What is the attitude of this member then? His answer will be, "If I can't take advantage of your insurance privilege, what's the use of my belonging to the organization?"

Again, forty such risks as this will have the tendency to bring up the rating average and make it more expensive to all 600 members, and you can not discriminate against a member. Preferred classification is a very difficult thing to arrive at, and it can not be successfully accomplished by a private organization without state powers, without leaving in its wake a trail of disgruntlement and antagonism against the organization.

After the committee had analyzed all the other proposals submitted, on the surface of things the most attractive seemed to be the organization of a mutual company. Enthusiasm was somewhat cooled, however, when it was discovered that at least $200,000 was necessary to organize such a proposition. After further inquiry, which developed a number of interesting angles, the mutual plan was definitely put aside as impractical.

Among the facts disclosed was that while liability insurance might be obtained at rates 25 per cent. below manual premiums, if written in companies incorporated in New Jersey, it could not be obtained in companies incorporated in New York State, except in cases where these companies returned very large dividends every year.

Recently a tremendous howl went up from the taxicab interests when the law requiring taxicabs to be bonded went into effect. The law was branded as discriminatory and unjust and its constitutionality was attacked in the courts of New York.

Despite the general sentiment of an adverse character which greeted this legislation from automotive interests, the bill itself is only a forerunner of what is going to come in the near future in New York State. My prediction, based on a study of legislation in various parts of the country and on the present trend of motor vehicle restriction, is that before long a law will make compulsory the insurance against liability of every commercial motor vehicle operated in the state and the bonding of every commercial motor vehicle against property damage. Incidentally, and appreciating that I will draw the fire of many motor truck operators, I say that this is a good thing because it will help drive out of the cartage business irresponsible and dishonest operators who do nothing to aid the industry but do much to degrade it.

Warehouseman Likes Electrics

Avowing that 80 per cent. of the warehouse duty in big cities could be done best by electric trucks, Charles S. Morris, president, Van Owners' Association of Greater New York, Inc., and owner of the Metropolitan Storage Warehouse, addressed a gathering of transportation engineers May 11, at a meeting held in the Auditorium, 130 East 15th Street, under the auspices of the Automobile Bureau of the New York Edison Company.

Mr. Morriss recounted the meritorious service of his fleet of electrics. He told how the average warehouse van takes an hour or more to load and unload. In May and September, Mr. Morriss pointed out, most moving and storing of goods is done. If horses are kept to do the May and September work they "eat their heads off," to borrow an expression from Mr. Morriss, "during the intervening months." Fire insurance and liability insurance, Mr. Morriss added, had come down 25 per cent. each because he used electric trucks. When he used to keep horses on the ground floor of his warehouse, the odors from the animals, despite extraordinary precautions, affected the stored materials.

For Testing Road Soils

An instrument for testing soils on which roads are to be built has been devised by the Bureau of Public Roads of the United States Department of Agriculture. It consists of a metal disk resting on the soil and supporting a cylinder into which shot can be poured. The apparatus is held in position vertically by means of a tripod, at the top of which is mounted a small dial that tells to one-thousandth of an inch how far the disk sinks into the soil as shot is poured into the cylinder. By means of the instrument it is possible to get information as to how the soil will act in wet weather.

The kind of soil beneath a road surface has a great deal to do with how it will stand up under modern traffic, and engineers look upon this as an important consideration in determining the kind of road to be built. This is confirmed by a number of instances where two sections of the same road have been built in exactly the same manner and subjected to the same traffic but on different types of soil. One section has lasted well while the other has broken up in a manner that can only be explained by a lack of supporting power of the soil beneath the road.

The bureau has for some time been investigating this question along various lines both in the field and in the laboratory, studying the characteristics of different soils and experimenting with means to keep down the moisture content of the soil and thus increase its bearing power. The latest development has been the new device.

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Two Trucks Save Ice Man $5,793.16 in Year

By P. DIGILIO
Brooklyn, New York

WE ARE in the wholesale and retail coal and ice business. Our coal is secured from the Somers & Conzen Coal Company yards at Third Street, and Knickerbocker Ice Company at Bond and Douglas Streets. Deliveries are made to residences, restaurants, hotels, small stores, markets and similar places, within a radius of 3 or 4 miles. Most of the deliveries are made in Brooklyn, but sometimes we reach into Long Island City. The roads are good and traffic is not heavy.

Our first truck, a 3½-ton Seldon, was bought about 5 years ago. The second, a duplicate of the first, was bought on November 15, 1919. The third truck was a 5-tonner, toward which we traded in the first truck on November 20, 1920. The fourth truck was a 1½-tonner, purchased October 6, 1921. Another 3½-tonner has been delivered. All our trucks have dump bodies with hydraulic hoists.

The 1½-tonner ordinarily carries about 1¾ tons to the load, the 3½-tonner carries 4 tons, and the 5-tonner carries 6 tons. All the trucks average about 2 trips a day, though this varies considerably. When there is work for only two trucks, we usually lay up the 1½-tonner. The larger trucks make more delivery stops, because most of our orders are in small lots. The 1½-tonner averages about 20 miles a day, the 5-tonner nearly 33 miles, and the 3½-tonner 24 miles.

Repair costs on these trucks have been most satisfactory. The 1½-tonner has not cost a cent for repairs, the 3½-tonner has cost only $200 in two years, and the 5-tonner has cost only $50 in a year. The 1½-tonner carries only a driver, but the other trucks carry both a driver and a helper.

The 1½-tonner costs $11.11 a day, 55.5 cents per mile, $3.174 per ton, and 63.4 cents per ton-mile. The 3½-tonner costs $20.43 a day, 62.5 cents per mile, $2.553 per ton, and 31.2 cents per ton-mile. The 5-tonner costs $21.32 a day, 88.7 cents per mile, $1.776 per ton, and 29.5 cents per ton-mile. Deducting wages the 1½-tonner costs only $6.11 per day, the 3½-tonner costs $12.93, and the 5-tonner costs $13.82.

We have been in business for 18 years. For 13 years we used horses, but sold them when we bought trucks. Trucks are less trouble and much more economical, because a 5-tonner or 3½-tonner does the work of 3 teams. Teams cost $7.00 a day, plus $25.00 a week for a driver. They can carry only 2 to 2½-tons to the load, and are slower than trucks.

RECORD OF 5-TON TRUCK.

Operating Records.

Total Period.

Period covered	1 year
Days operated	229
Total round trips	458
Deliveries—pickups	1,374
Total loads, tons	2,748
Miles traveled	5,500
Gasolene used, gallons	1,617
Cylinder-oil used, gallons	57.25

Daily Averages.

Round trips	2
Deliveries—pickups	6
Total loads, tons	12
Miles traveled	24
Miles per round trip	12
Load per trip, tons	6
Ton-mileage	72
Miles per gallon of gasolene	3.4
Miles per gallon of cylinder-oil	96

Cost Records.

Investments.

Chassis, complete	$6,918.09
Tire value	416.20
Total, less tires, to be depreciated	$6,501.89

Fixed Charges—Yearly.

Interest on total investment (7 years) @ 6%	$ 237.19
Taxes and licenses	70.00
Insurance	400.00
Garage expenses	360.00
Total per annum	$1,067.19
Total per month (per day $4.66)	88.93

Variable Charges—Period.

Fuel at 28c a gallon	$ 452.76
Cylinder-oil at 40c a gallon	22.90
Tires—5,500 miles ($416.20÷10,000-mile life)	228.80
Depreciation—5,500 miles ($6,501.89 ÷40,000-mile life)	893.75
Maintenance and repairs (estimated)	500.00
Total variable charges (per day $9.16)	$2,098.21
Driver and helper (per day $7.50)	1,717.50
Total fixed charges	1,067.19
Total operating costs	$4,882.90

Unit Costs.

Cost per day operated	$21.32
Cost per mile traveled	.887
Cost per ton hauled	1.776
Cost per ton-mile	.295
Repair cost per mile (estimated)	.0909
Repair cost per mile (actual)	.0091

RECORD OF 3½-TON TRUCK.

Operating Records.

Total Period.

Period covered	2 years
Days operated	459
Total round trips	918
Deliveries—pickups	1,836
Total loads—tons	3,672
Miles traveled	15,000
Gasolene used—gallons	3,191
Cylinder oil used—gallons	114¾

Daily Averages.

Round trips	2
Deliveries—pickups	4
Total loads—tons	8
Miles traveled	32.6
Miles per round trip	16.3
Load per trip—tons	4
Ton-miles (4 tons—16.3 miles)	65.2
Miles per gallon gasolene	4.7
Miles per gallon oil	131

COST RECORDS.

Investments.

Chassis, etc., complete	$5,305.00
Tire value	304.60
Total, less tires, to be depreciated	$5,000.40

Fixed Charges—Yearly.

Interest on total investment (5 years) at 6%	$ 190.98
Taxes and licenses	45.00
Insurance	400.00
Garage expenses	360.00
Total per annum	$ 995.98
Total per month (per day $4.34)	83.00
Total for period—2 years	1,991.96

Variable Charges—Period.

Fuel at 28 cents a gallon	$ 893.48
Cylinder oil at 40 cents a gallon	45.90
Tires—15,000 miles ($304.60÷14,000-mile life)	327.00
Depreciation—15,000 miles ($5,000.40 ÷40,000-mile life)	1,875.00
Maintenance and repairs (estimated)	800.00
Total variable charges (per day $8.59)	$3,941.38
Driver and helper—(per day $7.50)	3,442.50
Total fixed charges	1,991.96
Total operating costs	$9,375.84

Unit Costs.

Cost per day operated	$ 20.43
Cost per mile traveled	.625
Cost per ton hauled	2.55
Cost per ton-mile	.312
Repair cost per mile—estimated	.053
Repair cost per mile—actual	.013

Big Year Ahead

The year 1923 will be the greatest in the history of the truck industry and during the next year the Federal Motor Truck Company expects that orders will far exceed production, according to M. L. Pulcher, vice-president and general manager of the company.

"There is little doubt," Mr. Pulcher says, "but that the next year will be the greatest in the history of this company. Today our shops are running at capacity and a survey of the business market and the possibilities for truck sales in all sections of the country has convinced me that orders will exceed production—an almost unheard-of feature of the industry. To-day we are planning to expand just as fast as possible and we have placed orders for millions of dollars worth of material and we are planning next year's production on a much larger scale.

"I believe that business houses of the country are awake to the realization that the motor truck to-day more than ever before, must be utilized more intensively to broaden the transportation facilities of the country. Our distributer and dealer organization reports excellent prospects for 1923, and we believe that all records will be broken.

"It is a fact that the railroad industry is standing still and doing nothing to meet the increasing demands of improved business, and so acute has the situation become that there is actually a scarcity of transportation. There is only one medium to meet this scarcity and that is the motor truck. The other branches of the country's industries are advancing at every step, but the transportation facilities, the all important link in boosting business generally, has fallen down. With this in mind, I believe there is only one conclusion and that is that there will be a greater use of the motor truck in conjunction with the railroads of the country."

Expenditures totaling $214,075 of National Forest Highway Funds for the construction of 90 miles of highways in the State of Wyoming have been approved by Secretary of Agriculture Wallace. This money was made available for roads serving the national forests and for roads within or adjacent to the forests, which are of primary importance to the states, counties, or communities.

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Truck Front-Axle Standards

When the present S.A.E. Recommended Practice for Motor-Truck Front-Axle Hubs was reported to the Standards Committee in January, 1921, the report contained many detail dimensions that were not included in the recommended practice finally adopted in July.

In January, 1922, a new Division of the Standards Committee, known as the Axle and Wheels Division, was appointed to consider all matters pertaining to axle and wheel assemblies. Among the subjects assigned to this Division is Passenger-Car Front-Axle Hubs, a recommendation for which is now being formulated by a Subdivision, which has practically the same personnel as the Subdivision of the Truck Division that formulated the Report on Motor-Truck Front-Axle Hubs. At a meeting of this subdivision in April it was recommended that the complete dimensions for the threaded end of the spindle for motor-truck front-axle hubs, that were shown in the original report last year, should be incorporated in the present S.A.E. Recommended Practice to provide a complete standard for motor-truck front-axle spindles. It was also recommended that a supplementary table, to be used as general information only, be appended to the recommended practice to indicate the fundamental factors upon which the report was based. These recommendations were approved by the members of the Axle and Wheels Division by letter ballot. Therefore the Axle and Wheels Division recommends that the accompanying tables be approved by the Standards Committee for adoption as an extension of the present S.A.E. Recommended Practice for Motor-Truck Front-Axle Hubs.

DIMENSIONS OF MOTOR-TRUCK FRONT-AXLE SPINDLE-ENDS.

Spindle No.	5	6	7	8	9
Thread, U. S. S.	1⅛-7	1⅛-7	1½-6	1½-6	1½-6
Length of threaded end	1 9/16	1 9/16	1 13/16	1 13/16	1 13/16
Height from center-line of spindle to flat milled on threaded-end	7/16	7/16	9/16	9/16	9/16
Center of cotterpin hole to end of thread	3/16	3/16	3/16	3/16	3/16
Diameter of cotterpin hole	7/32	7/32	7/32	7/32	7/32
Width of groove at back end of thread	1/8	1/8	1/8	1/8	1/8

GENERAL INFORMATION FOR MOTOR-TRUCK FRONT-AXLE HUBS.

Spindle No.	5	6	7	8	9
Spindle load rating in lb. on solid tire at ground	1,250	1,625	2,125	2,750	3,500
Solid tire size	34x3½	36x4	36x5	36x6	36x7
Solid tire load rating, lb	1,300	1,700	2,500	3,300	4,200

Road Costs Receding

A considerably lower level of prices for the various items entering into highway construction is reported by the Bureau of Public Foads of the United States Department of Agriculture. This conclusion is based on the following prices by successful bidders on federal-aid roads during April and are averaged for the whole of the United States. Some of the figures cover a large volume of work well distributed over the country, while others are based either on small volumes or scattering reports.

The figures which cover the cost in place are as follows: Earth excavation, common, 33 cents a cubic yard; rock excavation, $1.26 a cubic yard; gravel, $1.44 a cubic yard; sand-clay, 45 cents a cubic yard; crushed stone, $3.42 a cubic yard; structural concrete of various classes ranges from $14 to $21.25 a cubic yard. For surfacing the following are the prices by the square yard: Gravel, 40 cents; surface-treated macadam, 50 cents; bitumious macadam, $1.06; bituminous concrete, $1.97; plain cement concrete, $2.17; reinforced cement concrete, $2.54; and brick, $3.70. Reinforced steel has cost $0.053 a pound and structural steel $0.059 a pound. Cement has been furnished to contractors by the following States at the prices given by the barrel: New York $1.73; Wisconsin, $1.94; and Arkansas, $2.70.

Novel Refuse Body

An English concern has recently built a special refuse collecting body on a truck chassis for the Caterham Urban District Council. In designing the body the idea was to make one that would automatically unload itself without the use of dumping mechanism. The floor is pitched like a roof and covered with sheet-metal to insure the whole of the load being automatically shot out as soon as the sides are dropped. The sides are made in two parts to reduce difficulty in lowering, and at the top of each portion there is a small hinged door, which when dropped reduces the height to which the man has to raise the bin before depositing the rubbish in the truck.

The space under the pitched floor is used as a locker in which the loading ladder, rakes, shovels, etc., can be carried. There is also another locker at the rear of the body for the storage of disinfectant.

The body is designed to carry 2 tons of rubbish, and is fitted with a waterproof tilt cover in four sections, each section being fitted with "lightning" fasteners enabling each one to be opened independently. The cab follows common practice, but has a waterproof canvas and celluloid storm-curtain, which hinges to the roof when not required.

Railways Buying 'Buses

The fact that he may reside blocks from a car-line is not causing the commuter as much inconvenience as formerly. Electric railways in their desire to serve patrons better are installing motor' buses for the convenience of riders living in sections not adjacent to car-lines, and many a commuter now finds it possible to step from his porch into a waiting motor 'bus and be whirled away to the nearest transfer point on an electric line.

Electric railways are rapidly turning to the motor 'bus as an economical means for extending service and serving the public better. Numerous well-known traction companies have added motor 'bus equipment in recent months and indications are the electric lines ultimately will become large users of the gasolene carrier. Railways in a number of cities have purchased 'buses for the establishment of feeder lines and initial experiments have proved so successful that many roads, after giving the 'bus a thorough trial, have decided greatly to increase their 'bus equipment. The 'bus offers an excellent cross-town transportation medium and is far less costly than equipment necessary for the operation of electric cars.

The Milwaukee Electric Railway & Light Company is a large user of 'buses. The company has 18 White 'buses in service and nine more on order which will be put on the road within the next few weeks. Three of the company's 'buses are in interurban service between Milwaukee and Waukesha. Other electric lines having recently purchased similar motor 'buses are the Northern Ohio Traction & Light Company, Akron, 13; the Rockford & Interurban Railway, Rockford, Illinois, 6; and the Pennsylvania-Ohio Electric Company, 5. All five of the P.-O. 'buses will be used in interurban service.

Filtration Plant on Truck

The British War Office has recently taken delivery of a very interesting motor truck. The chassis is a 4 ton A. E. C., and the plant mounted thereon consists of a Lister auxiliary engine driving a rotary pump, filters to remove foreign matter from the water and a chemical apparatus that ensures the filtered water being quite sterile. The chassis is fitted with strengthened rear springs, and the frame is reinforced by a tie bar to carry the heavy concentrated loads of filter and water tank. The plant must be capable of producing 800 gallons of pure water per hour from any source before it is acceptable by the War Department. At the rear is a small compartment where the chemist who would accompany each vehicle on active service can carry out the chemical and bacteriological tests.

When on service, in view of the value of the equipment, the truck is not left unattended, and with this in view the driver's cab has been arranged so that it can serve as a sleeping berth. The front and sides of the cab can be completely closed by means of curtains, and a folding bunk has been fitted above the seat. When this bunk is in use the driver's mate can use what is normally the driver's seat.

Though designed especially for military service, there are doubtless many cases on big development jobs where a vehicle of this description would be most useful.

Bewails Truck Competition

The competition of highway transport was again bewailed by W. J. Tollerton of Chicago, chairman of the annual convention of the American Railway Association in Atlantic City recently. Mr. Tollerton said:

"The railroads are confronted with a field of competition in the form of automobiles and motor trucks which is having a serious effect on local traffic, both passenger and freight. Insofar as trucks are concerned they are in a position to operate at a very low cost, practically on a government subsidy, having no other expense than a small tax in investment or maintenance of roadway, terminal and other station requirements."

In Ontario, Canada, one farm in every four has a motor vehicle.

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Costing Professional Haulage Work

By JOHN DEVINE
President, Cleveland Cartage Company, Cleveland

EACH business even in the same line has many individual characteristics so that one rule can not be made to fit all, but certainly we can meet on some common ground and say this is fundamental. Owners of trucks for hire should have something more than a sixth sense to guide them in the pricing of their service. Costs must be known. Earnings must exceed the costs.

While it is generally conceded that figures don't lie, it is a well known fact that liars do figure. Consequently, I will not attempt to say what the cost of operation of a truck for any given day's work should be. This cost is dependent on too many things—the nature of the work done, the human element, amount spent on maintenance as distinguished from repairs, and the number of miles run. Each in its own way affects the day's cost

Not much need be said about road, load, and driver. Maintenance however is the stitch in time that saves nine. It is adjustment rather than repairs—a little every day, about the same time one would give a pair of horses. Maintenance is a difficult thing to have conscientiously done as it is very hard to check. The repairs on a truck maintained at the highest possible point will easily be $1.00 a day less than those on a truck doing the same work and not systematically maintained.

In a fleet where nine trucks are the same make and model and within a few months of the same age, one 31 months old has cost about $25.00 for repairs. This is due to consistent inspection on the part of the driver who wishes to drive a truck better than anyone else and systematically replaces and adjusts one part after another. Other similar trucks in this fleet have no comparable record to point to.

Miles run are on the basis of several important costs. Gasolene, oil and supplies are directly affected by distance. Likewise depreciation, tires and repairs are properly figured by the mile. Labor, overhead and insurance round out the items of cost.

The various national costs systems advanced did not fit our business and we early put in our own. At first crude and of little value, we changed it here and there and finally have a method made to fit our own business.

In principle it is two systems, an actual and a combination of actual and arbitrary. For each truck these are both kept on the same sheet. The actual is posted once a month. Totals of each expense for the month in one column, the next column contains previous total, then total to date this year, days to date, and this divided into the amount spent for each item gives the factor, unless the factor is based on miles run.

Advertising, donations, general expenses, superintendent labor, shop labor, idle time, interest, light and heat, supplies, passenger-car expense, postage and stationery, rent, salaries, taxes, telephone and telegraph, discount, bad accounts, depreciation of fixtures, depreciation of miscellaneous equipment, etc., are totalled together, divided by the number of trucks we have, and listed as overhead.

Overhead is always with us. Others may differ from mine, but whether one have one truck or one hundred, whether one operates trucks for hire, or for his own use he has overhead expense.

Along with this stands insurance about which little need be said. Next labor, direct and indirect. Labor which is used and paid for by a specific productive job is direct labor. Labor for which one does not get a direct money return is indirect labor. If a truck is out and paid for 7½ hours, but the owner keeps and pays the driver 10 hours, 2½ hours of his labor is indirect, even though usefully applied. Therefore the actual working hours of a truck must be known.

Depreciation is based on the probable life of the truck. If one establishes 60,000 or 75,000 miles as its life, that figure divided into the cost gives the depreciation in cents per mile.

On the actual side of the sheet which we are now considering tires are charged only when purchased. After sufficient time has elapsed this will check the tire factor used.

Likewise repairs subdivided into material, labor and outside repairs and maintenance labor are entered as used. The left margin makes a good place to itemize repairs. Gasolene, oil, grease and supplies are entered from the records. This ends the itemized costs. Below them total sales, total cost, profit or loss can be forwarded month by month; sales per day, cost per day and tire mileage with below a complete tire record.

Now so far the system is always behind time. Too much so to be of the most use. Based on experience therefore we will assume that for a given mileage certain costs will be so much and that for a day overhead will be so much. From month to month these figures should be adjusted to what the actual costs show are correct. Here is where the different factors arrived at in the actual system come in.

In the arbitrary system the job and amount of earnings are entered, then hours operated, and miles run; the first basis for direct labor, the second for depreciation, tires and repairs. Next to mileage comes gasolene and oil in gallons and quarts. This gives at a glance the day's mileage. Next come direct and indirect labor, depreciation, tires and repairs, overhead, insurance and gasolene, oil and supplies in dollars and cents. Total costs, earnings, profits, profit or loss follow in the order named. The day's story of that truck is complete. At the end of the month the totals at the bottom of the page give a complete itemized report. If one operates 20 trucks one will have 20 such pages.

This would make the scanning of them laborious and minimize their usefulness. A recapitulation on a daily sales report should therefore be made. This is a twelve column sheet headed: Billing, Car Number, Hours Run, Miles, Labor Cost, Repairs, Tires and Depreciation, Overhead, Insurance, Gasolene, Oil, etc., Total Costs, Earnings, profit, and Loss. Properly filling this in from the sheets already filled out gives at a glance the detailed operation, total sales, itemized sales, and in the lower right hand corner the profit or loss on the day's business. When this sheet is finished the pay cards are up to date, the gasolene pump is checked, and one has all the news before him. For this last sheet we use a listing machine with twelve stops.

These daily sales reports are, at the end of the month, entered on a monthly summary report and at the end of the year on a yearly report. They may be reconciled with the auditor's statement for the different periods.

Such a cost system points out inequalities, leaks and extravagance. It holds up exceptional performance for approval and condemns slip-shod methods. It furnishes incentive for high grade performance. It is a good teacher, a hard master, and will be a joy forever only when every operator uses it and so furnishes competition based on reason.

California Widening Roads

The California State Highway Department has begun a systematic widening of state highways in many parts of the state and has adopted the Maryland policy of surfacing some of its concrete roads with asphalt. California has also begun work on a considerable mileage of bituminous macadam. In Glenn County 8½ miles of road will be of bituminous macadam, 5 inches thick and 20 feet wide. Five miles of concrete road in Placer County will be surfaced with 3 inches of asphalt. The same treatment will be accorded 3 miles between Fairfield and Vacaville in Solano County. In Sonoma County, 3 miles north and 1¾ miles south from the Petaluma city limits, a total distance of 4½ miles of concrete road will be widened to 20 feet and surfaced with asphalt. Four and one-half miles of concrete road in Santa Clara County, near Carnadero, will also be surfaced with asphalt. Similar treatment will be given 16 miles of concrete roads in Merced, Madera and Kern counties.

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California's New Highway for Truck Traffic Only

By R. F. McCLELLAN
Chairman, Road Division, Los Angeles County Board of Supervisors

THE business district of Los Angeles is separated from the city's harbor located at San Pedro by 22 miles of level country. With a large and rapidly growing tonnage of miscllaneous goods to be moved between the city and its harbor in each direction, the motor truck as a transportation medium has assumed a constantly increasing importance in the movement of this freight. Economical truck hauling, however, presupposes a paved highway, and heavy truck traffic requires a paved highway of unusual strength. As no improvement of this kind has heretofore been made between the city proper and the harbor, a coöperative arrangement has been concluded between Los Angeles, and the Board of Harbor Commissioners for the building of a modern truck thoroughfare of ample strength to carry the loads. The Harbor Truck Highway is being built of reinforced concrete, 8 inches thick and 24 feet wide. Nearly 8 miles of this pavement has already been completed.

Motor truck transport has been given a strong impetus by the high freight rates, and at present this method of transportation is being used largely for moving freight to and from San Pedro over the Harbor Boulevard. But the excessive cost of maintaining this road, built largely of macadam, the presence of several grades on the route, and the fact that it does not reach the industrial center of the city, made the construction of a highway especially for trucks a much needed improvement.

In 1922 the citrus fruit industry will ship a larger portion of its freight to the harbor by truck. Trial shipments made in 1921 by water to the Atlantic coast resulted so satisfactorily that plans were perfected for sending the major part of 1922 shipments by this route. Trucks loaded at the packing-houses in the orange and lemon growing districts haul the fruit direct to the docks.

The fishing industry is also a big user of truck transportation. Extensive fishing operations are carried on off San Pedro by colonies of Japanese, Austrians and Italians, and on Terminal Island are located many canning establishments which pack tuna, barracuda, and sardines. Even a small cannery or a wholesale fish dealer can fill a truck without trouble, where a car-load shipment would be out of the question. A great deal of the fish is consumed in Los Angeles and nearby cities.

Plans have been prepared by the county for its third unit of the Harbor Truck Highway; this section will be approximately 5.8 miles in length. The second unit was completed in April, 1921, and is now carrying considerable traffic, although it lacks a good connection with the harbor.

Two plans of reinforcing were used on the work done in 1921. On 2.4 miles one layer of rectangular wire mesh was placed 2½ inches below the surface, while on the remainder of the work ⅜-inch square deformed bars were installed at the same depth. Transverse bars were spaced 18 inches apart and extended to within 3 inches of the pavement edge. Bars placed longitudinally were 7 feet long, spaced about 3 feet apart, and lapped 15 inches. The outside bars were placed 6 inches in from the slab edges.

The bars were first laid on wooden supports and wired together at all intersections by two men, who then carried the section in as a unit, and placed it on a frame made of four 2 by 6-inch pieces held together by 1-inch pipe. Wire cables held this frame to a 2 by 8-inch plank fastened to the rear of the mixer; the frame supported the reinforcement at the proper height. The 2 by 6-inch supports were of such length that the mixer chute reached beyond them. The bars were therefore supported in part by the platform and were also imbedded in the concrete back of the frame.

Concrete was tamped, with a 2 by 10-inch steel-shod hand tamp fitted with plow handles, and then rolled. Next the surface was evened off by means of a 16-foot longitudinal wooden float equipped with 4-foot handles, the men working from two light bridges. This float is used in much the same way that a belt is operated in going over concrete for the last time. Finally the surface was gone over with long, wooden floats, which were also used from the bridges. The longitudinal float was employed on all this work, and there is a noticeable difference in the evenness of the pavement in favor of this method.

Earth dykes were constructed on the pavement as soon as the concrete was strong enough to permit and the surface ponded. This method of "curing" is especially good in southern California because an earth covering will soon lose its moisture due to the dry, warm atmosphere.

A ¼-inch expansion joint was placed at the end of each day's work, but no other joints were made. With the larger of the two mixers an 8-hour's run shows an average of 340 feet, so that the joints are well separated on part of the pavement. Materials were stored on the sub-grade and wheeled to the skip.

The sections of the Harbor Truck Highway in Los Angeles and at the harbor end will be made of equally heavy construction. The Board of Harbor Commissioners has set aside the funds needed for building a 3,500-foot viaduct and the pavement needed at San Pedro, and also for the Terminal Island connection. In order to eliminate a steep grade on the San Pedro branch, it was necessary to cut down a large hill to construct a long concrete retaining wall.

Already the port of Los Angeles is proving a profitable venture, and it is expected that bond interest and principal can be paid from the revenue received. The city has voted in all $10,000,000 worth of bonds for harbor development, and will doubtless provide more. Over $6,000,000 have been spent by the United States government in dredging and in breakwater construction, and the harbor is now headquarters for the super-dreadnaughts of the Pacific fleet. The present harbor lines were established by the War Department in 1908, and the consolidation of Los Angeles with the harbor cities of San Pedro and Wilmington was effected in 1909. The city of Los Angeles now controls the entire water frontage of 24 miles, and most of the tidelands, which are rapidly being reclaimed. It has erected a concrete warehouse with over ten acres of floor space, and plans to build three more large units. Thirty-seven steamer lines now make San Pedro a terminus or port of call. All this development demonstrates the faith that Los Angeles has in its harbor, and points to the need of rapidly pushing the Harbor Truck Highway to completion.

Big Trucks Do Little Damage

At a recent meeting of the Motor Truck Club of Massachusetts, Francis I. Maslen, one of the Highway Investigation Board, appointed by Secretary of War Weeks, to determine the cause of the detioration of the highways, stated that, while the complete report of this board, which is comprised of officers of the War Department, members of the Massachusetts Institute of Technology and various highway officials (including John N. Cole of the Commission of Public Works of Massachusetts), is not yet ready, with the delicate instruments with which the tests were now being made they had discovered the surprising fact that the surface of the modern highways is not injured to any appreciable extent by the slower moving heavy-duty trucks but that the great deterioration is caused by the lighter weight motor vehicles running at high speed. In view of the fact that this is entirely at variance with the information which has been given out by many who have not had an opportunity of making a scientific study, it is believed that this information will be of value and interest, in view of the fact that the Commissioner of Public Works is seeking to penalize the heavy-duty trucks in his bills before the Massachusetts legislature on the statement that these large machines are the cause of wearing out the highways.

It is found that most of the ruts that have been made in the highways show that they are caused by vehicles of the standard gage, and the ruts are not of the gage which is used in the heavy-duty trucks.

With these facts in mind it can be easily believed that those who are interested in the highways can not further advocate the penalizing of the heavy motor truck by placing fees on these vehicles at higher rates than those at which they are now operated.

A regular daily motor service has been inaugurated between Kweiteh, Honan, and Pochow, Anhwei, in China, a distance of 45 miles. With the exception of the last five miles between Kweiteh City and Kweiteh Station, which were built by merchants, the road has ben constructed out of public funds by famine sufferers.

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German Industry Grows in Export Trade Since 1921

FREIGHT RATES STIMULATE TRUCK USE

Activity previals in the German automotive industry, many companies having contracts for their entire output until the end of the year. Exports have declined somewhat, though machines sold abroad during the first half of 1922 exceed the number so disposed of during either the first or the second half of 1921. The domestic demand is mainly for light and medium weight cars, owing to high operating costs.

The following table shows the number and value (in marks) of motor vehicles and motorcycles exported in 1920, 1921, and first six months of 1922:

Months.	Vehicles No.	Vehicles Value.	Cycles No.	Cycles Value.
Total, 1920	17,534	$1,184,295,000	3,541	$25,564,000
January to June, 1921*	3,810	217,504,000	1,226	8,969,000
July to December, 1921	4,420	466,496,000	1,474	19,631,000
January to June, 1922	5,002	799,340,000	2,392	50,193,000
January	1,091	138,386,000	590	7,882,000
February	684	87,414,000	348	6,738,000
March	972	154,514,000	377	7,363,000
April	764	123,336,000	364	8,119,000
May	869	156,876,000	394	9,267,000
June, 1922	622	138,814,000	329	10,824,000

*Estimated.

For the first half of 1922 only 1,841 of a total of 3,146 motor vehicles exported were trucks. Their value was 267,633,000 marks. The value of all machines exported was 799,340,000 marks.

Holland took 570 passenger-cars and 495 machines in the first half of 1922, Belgium 305 passenger-cars and 239 trucks and Denmark 387 passenger-cars. Holland imported 620 German motorcycles.

Prices reflect the persistent inflation of currency. The domestic price of a 3-ton truck is about 950,000 marks (without tires), against 200,000 marks last November. Meanwhile a 5-ton truck has risen from 230,000 to 1,000,000 marks. The export price to the United States of the smaller truck is $2,440 and of the 5-ton truck $2,500.

The internal demand for motor trucks is increasing, owing to constantly rising freight rates. The cost of transportation by truck is said to average 10 per cent. cheaper than by rail and the service is quicker.

The use of automobiles as public conveyances is growing. New 'bus lines are being opened in Berlin. The postal department is transporting passengers in automobiles, now owning 744 cars for interurban passenger transport against 205 cars in this service in 1913. The postal department also owns 644 cars for mail transportation, and 200 attached to the telegraph service.

Interurban traffic is profitable for postal administration and is one of the few divisions which does not require a government surplus. The cars cost 1,125,000 marks each and in the aggregate cover over 40,000 kilometers a day.

There are about 90 automobile factories in Germany with 10,000 employees. There were 118,119 motor vehicles registered July 31, 1922, against 93,072 in 1914. Registrations include 60,966 passenger-cars, 30,424 trucks and 26,729 motorcycles.

Yellow Cabs Abroad

The taxicab business of Europe will be revolutionized by the Yellow Cab Company, according to the company's president, John Hertz, who has returned from France after a tour of the continent in the interests of his concern. He carefully considered the taxicab situation in England, France, Belgium, Holland, Czecho-Slovakia and Switzerland, and expressed himself as certain that American methods of operation and building of taxicabs would soon become the rule instead of the exception in those countries.

A syndicate of Parisian bankers is financing the installation of Yellow Cabs in Paris, Mr. Hertz added. An initial order of 25 cabs has been placed with the Chicago company and an additional order of 475 is to follow, if the service proves satisfactory. In preparation for the inauguration of the Parisian company, Captain Marcel de Journay will arrive here early in October for an intensive survey of the Yellow Cab methods and efficiency. When he returns to France in December, two representatives of the company will go to Paris to aid in installing the service and an official of the company will maintain headquarters abroad permanently.

The French operation will contain several unique features which will revolutionize the industry there. The chauffeurs for the Paris service will be recruited from the thousands of unemployed ex-army officers. The Yellows there will eliminate tipping, breaking up a system under which it is practically impossible to hire a cab without tipping in advance. Paris now has only 3,500 cabs in service.

A London agency for Yellow Cabs already has been started. The situation there is held to be favorable as labor is cheaper than here, the taxi fare is 32 cents as compared with 20 cents for Chicago, although gasolene is higher.

The situation for the introduction of the Yellow system is considered favorable, as the motor industry abroad continues demoralized. There are few privately owned motor cars and the taxis are built from antiquated passenger vehicles in many cases.

The Yellow Cab Company is not planning to establish a factory abroad or to arrange for stockholders to obtain stock in any other company, Charles W. Gray, vice-president and general manager of the company stated. Neither will the Company be concerned in a financial way, he added.

For serving its patrons within a radius of 30 miles from the home plant the Wagner Pastry Company of Newark, New Jersey, has purchased a fleet of 177 one-ton C. T. electric trucks. It also uses a 5-ton Pierce-Arrow for raw material haulage.

Railway Propaganda Aimed at Trucks Is Extravagant

MOTT SHOWS ABSURDITY OF CLAIMS

C. S. Mott, vice-president of the General Motors Corporation, has discovered increasing evidence of a "well-defined movement" to attempt to discredit motor transport as an economic movement in commerce by alleging that it damages the country's highways to an alarming extent. In Wayne County, Michigan, he has found a traction line which placards its cars with information to the effect that heavy trucks damage the roads of the country to the extent of $1 a mile per truck, leaving it to be inferred that shippers should use the rail lines instead of trucks and thereby save the taxpayer the amount now expended for highway up-keep. Mr. Mott shows the absurdity of this extravagant claim by pointing out that, if this statement were true, Wayne County roads must have been damaged to the extent of $450,000,000 in one year by the operation of only 5,000 trucks over 300 miles of roadway.

"It is perhaps only natural that electric interurban lines, which feel so keenly the freight competition of motor trucks, should feel justified in making a fight for freight business, but they will not get very far by basing their campaign on statements which are not borne out by the facts," he declares. "Modern practice in road-making keeps well abreast of the demands made on the roads by increasing volume and tonnage of vehicular traffic. Marked advances in highway construction have been made in the last five years, which have also been distinct advances in the motor truck. The modern roadway is well planned and constructed to resist the effects of traffic. Moreover, the cost of maintenance, taken the country over, is gratifyingly small.

"If all of the anti-truck propaganda is as inaccurate as its estimates of highway damage by trucks, it will not get very far. It should be said, moreover, that the shipper and the truck owner are not the only ones to benefit by highway transportation; the ultimate consumer, who in the aggregate makes up the general public, benefits, too. And, incidentally, the truck owner, shipper and consumer are all taxpayers and bearing a share of the investment in good roads.

Rapid vehicular traffic is admittedly hard on road surfaces, and heavy loads are hard on any but the very best highways. There is an economic limit to the advisability of spending money on highways of the best type, based upon volume of traffic and other conditions, but not all the roads of the country have yet been brought to such a state that this economic limit is a very imminent factor."

Several of the larger railways are attaching express cars to their small way-station local passenger trains, and giving express service on package freight. This service has been brought about by the competition of the motor truck highway express lines, but it gives the public better shipping facilities at low cost which is a factor in reducing costs to customers.

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Street-Cleaning in London

The city of London, England, owns only 11 motor vehicles, and these are used solely in the cleaning department. Transport in all the other branches is carried out by contract by the firms responsible for the various jobs. But if the fleet be smaller than one would anticipate in such an important city, any lack of interest caused thereby is more than made up by the unusual conditions under which the machines work, and the fact that 75 per cent. of the fleet is on the road practically the whole 24 hours of each day. It would be difficult to find more strenuous conditions, and one wonders if the vehicles can give the best results, as so little time is allowed for running repairs and overhauls, says a writer in *Motor Transport*.

Covering an area of one square mile are 50 miles of road that W. J. Heavey, the cleaning superintendent, has under his care. There is no need to emphasize the congested nature of the city area and the heavy traffic therein, as such points are well known, but they have a very important bearing on the work of street-cleaning and refuse collection. The points mentioned mainly make themselves felt in the form of very rigid time limits in which the work can be carried out. For example, the streets can only be cleaned at night—traffic conditions make such work entirely out of the question in the daytime—and the bulk of the refuse collection has to be completed every morning by 10 o'clock. As regards the latter work, it is found that 60 per cent. of it has to be done in 2 hours because, though the men and the trucks may be ready to start early, the average shopkeeper and office caretaker will not put his bin outside before 9 *a. m.*

For this work of street-cleaning and refuse collection the City of London employs about 90 horse wagons, six 2½-ton gasolene trucks (fitted with interchangeable refuse and water-tank bodies), and 5 sweepers. Excepting in frosty weather, all the streets in the city boundary are cleaned every night. The work starts at 8 P. M. and finishes at 5:15 A. M., and all three types of vehicles are employed. In considering this particular job, we should point out for the benefit of those not familiar with street-cleaning problems that, on roads with much traffic, manure and dirt generally when lying on the street become very hard and solid, the result being that it is difficult to shift by a revolving broom without a preliminary softening by water. If one observes the street scavengers at work, one often sees that they have to use the scrapers of their brooms very vigorously before they can shift the dirt. This solidifying of street refuse means that it is necessary for the surface to be sprinkled before the sweepers can get going; sometimes, in very dry weather, an interval of half an hour is allowed, and then it is found necessary to sprinkle again before sweeping. Of course, the sprinkling is not necessary in really wet weather, and every evening the assistant superintendent has to decide whether the streets shall that night have a wet or a dry cleaning.

Continuing the process, the five sweepers do all the sweeping throughout the city, and their work is followed up in each street by the scavengers, who, in turn, are supported by the horse carts. The latter convey the stuff to the city wharf, on the south side of the Thames, near Waterloo Bridge, where it is dumped direct into barges and taken to Hornchurch. Mr. Heavey, by the way, is not in favor of the big combined sweeping and collecting machine. He considers that this method entails the cartage of a lot of unnecessary liquid, as no time is allowed for the sweepings to drain. What he does favor, however, is a light machine that can be used to make the final sweep and collect at the same time after the rubbish has had time to drain.

During the street-cleaning operations the trucks are, of course, working with their tank bodies, each of which has a capacity of 750 gallons, but if the weather has been very rainy and no sprinkling is necessary, they are used to supplement the work of the horse carts, and, therefore, carry refuse bodies. Whatever the night job, the trucks work on refuse collection in the mornings. At the Thames side wharf, where the refuse is dumped, the vehicles are garaged, and a feature of the equipment is the method of changing the bodies. A vehicle comes in with a tank body, runs into the building, and the body is lifted off and suspended in mid-air, its forward end being held by a single chain and the rear resting on a wooden support. The chassis is then driven forward and back underneath a truck body. The complete change can be carried out by a couple of men in 10 minutes, and its success is due to having all the bodies strictly interchangeable.

It should be added that the trucks are maintained by the makers under contract, while the sweepers are cared for by the cleaning department's mechanics. As regards gasolene consumption, the sweepers cover 8 miles per gallon, and the trucks about 3 miles per gallon; the latter figure is not out of the way when one considers the nature of the work on which the vehicles are engaged, which is extremely unfavorable to economy in fuel consumption.

British Motor Industry

The year 1921 has been more than usually full of troubles for the British motor industry. It has suffered from the aftermath of various strikes directly and indirectly affecting output, from stocks of material purchased at top prices, and from the serious competition with new products offered by the thousands of government surplus war vehicles put on the second-hand market. This latter phase was especially true with respect to motor trucks, passenger-cars being less affected.

Following the armistice and up to as late as the summer of 1920, the demand for machines was far in excess of supply. There was no industry for which the future appeared brighter, and extensive preparations were made for a prolonged period of phenomenal activity. The late autumn of 1920, however, witnessed a complete reversal of these conditions. The British motor industry was one of the first to be affected by the depression which succeeded the artificial boom. Concerns which had scarcely completed the installation of sufficient equipment to provide for a greatly increased output were confronted with a state of affairs in which the sale of even a small proportion of this output at a remunerative figure became a difficult matter. The demand for both trucks and cars in the United Kingdom was practically negligible by the beginning of 1921.

In a normal year many important British firms export 50 per cent. or more of their output. Had foreign markets remained open to these manufacturers during this season of greatly decreased domestic demand, the result of the year's trading would have been far less serious. The following official returns of exports clearly indicate the loss sustained in this channel:

Motor Vehicles.	1920 Number.	1920 Value.	1921 Number.	1921 Value.
Motor trucks	1,015	$ 4,705,350	784	$ 3,445,100
Passenger cars	4,294	14,978,955	1,970	8,217,130
Chassis for motor cars	3,124	12,338,400	1,046	4,818,940
Total cars and chassis	8,433	$32,022,725	3,800	$16,481,170
Motorcycles and tricars	21,285	8,343,515	8,103	3,313,680
Grand total	29,718	$40,367,240	11,903	$19,794,850

It will be noted that 1921 represents but 40 per cent. in number and 50 per cent. in value of the export business done in 1920. Compared with 1913, the British automotive exports for 1921 are slightly less than half of the former period in number, while the total value has increased approximately one-seventh.

The British colonies and possessions have hitherto taken about 50 per cent. of England's exports of motor vehicles. The extent to which demand has dropped off in this quarter is shown by the fact that in 1921 British India, the largest single customer, took but 745 trucks and cars as compared with 1,570 for the previous year. Exports to New Zealand fell from 829 in 1913 to 464 in 1920 and to 151 in 1921.

Road Work in South Carolina

A proposal to spend $34,000,000 within six years and to complete within that time 4,000 miles of the state system, more than 600 miles of which would be hard surfaced and the remainder surfaced with sand-clay, top soil, or gravel, is to be urged before the present session of the legislature of South Carolina. In order that this proposal should conform to the federal-aid acts, the state highway officials recently held conferences with representatives of the Bureau of Public Roads of the United States Department of Agriculture. If this greatly expanded program is carried out, the state will match all of the federal-aid money now available and any future appropriation that may become available. Funds will be raised by motor vehicle licenses, by continuing the state-wide 2-mill property tax, a 1-cent-per-gallon motor fuel tax, and a bond issue of $10,000,000.

Frank E. Smith has been elected to the membership committee of the motor truck committee of the National Automobile Chamber of Commerce. Mr. Smith is president of the Republic Motor Truck Com-

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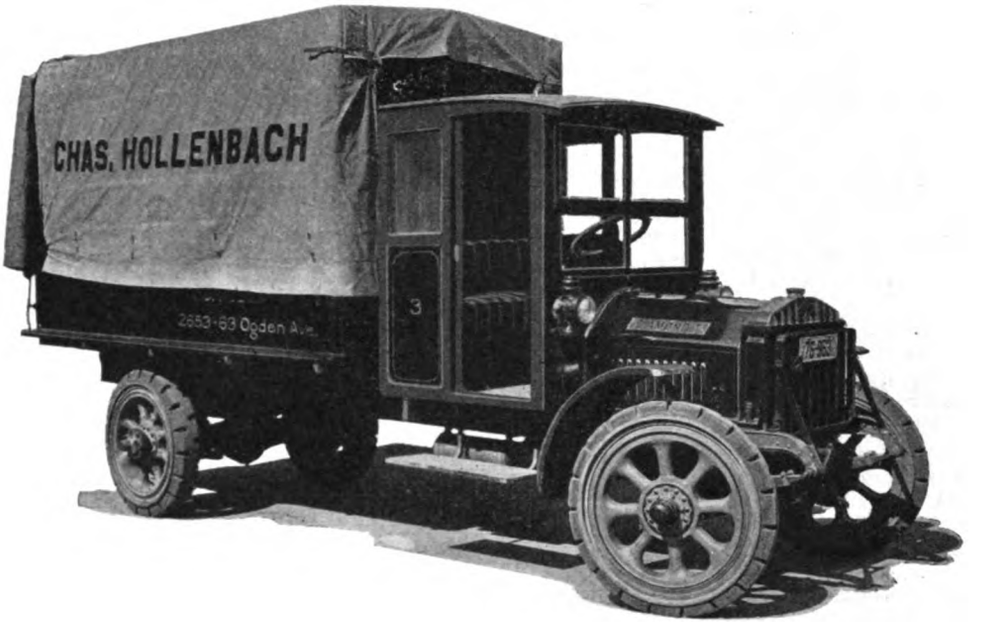

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have been using the rigid type of Smith Wheel as standard equipment, with entire satisfaction, for the past four years on their 3½ and 5 ton models.

Smith Wheels in the 2-2½ ton size are the greatest sellers because many more trucks of this capacity are built than of the heavier models.

Smith Cushion Wheels as well as the pneumatic type for light duty trucks are rapidly increasing in demand and popularity.

SMITH WHEEL
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Correspondence

General Correspondence, Criticisms Suggestions, and Discussions Concerning Any Subject of Interest to Those Who Design, Manufacture, Sell or Use Commercial Motor Vehicles, Their Parts or Accessory Equipment, Are Solicited

Comments on Distribution

To the Editor.—Looking back over twenty years of motor trading history, it is plainly seen to be the history of the bicycle trade repeated with few variations, if any. Nothing has so far happened in the motor trade that did not have its exact parallel in cycle trade history. We have seen the same mistakes made, the same illusions, the same slumps and booms, the same over-capitalization of firms, the same new dealer experiments tried, the same good and satisfactory systems abandoned, and the same lamentable results of doubtful changes.

We have seen manufacturers open their own branches in cities and close them again. We have seen them abandon "closed or exclusive agency" systems for "open territory" policies, only to find them unsatisfactory, and then endeavor to seek a way out by a combination of both in some measure. We have seen them sell their entire outputs to one or several big buyers, and reduce some hundreds of customers to one or a few, with the lamentable result of setting the trade against them. We have seen them appoint too many agents in one area, or endeavoring to sell to all and sundry who profess to be in the trade, with the natural result of "price cutting" to an extent undreamed of. All this and more.

In opposition to all this we have notable examples of a few respected old firms with sound sense, who have stood firmly by their dealers, through all the vicissitudes, to the well-tried and proved "closed territory" systems of a score years ago or more, and have distinctly scored thereby. These are respected by all their agents, and there is a stability and continuity about their respective businesses which is an unassailable asset.

Here are a few axioms for the whole trade to sit up and take due notice of:—

Chopping and changing of selling policies leads nowhere.

Changes from year to year disgust dealers and customers alike. Stability of demand is impaired, and a business loses cohesion and continuity.

A selling policy of any kind does not create one more potential buyer. The policy of any manufacturer can not make a man possess $1,500, $2,500 or $5,000 to buy a machine, if he has not got the money.

Sales for either manufacturer or dealer depend on prevailing economical and trading conditions either generally or locally.

It is a mistake to imagine every firm has either a desire to purchase a truck, or can afford to do so.

For a manufacturer to open a selling branch of his own in any city or town, means that it must either do all the retail trade of a district and thus lose all dealers' support, or merely become a wholesale distribution depot for the dealers around, in which case it can not pay its own expenses. In either case the manufacturer may lose trade, and hence eventually close it, as proved in many cases.

No one agent can sell *all makes* of trucks, even though he has the monopoly of all. Three or four makes is the limit.

No agent can make a high-class or expensive depot pay solely by the sale of *one make* of truck, except in a very large market. Neither can a manufacturer.

No manufacturer can sell his make of truck equally well in every district, or equally well all over the country.

It is by no means sure that if a certain dealer has sold well one make of truck over a period of years, that he can sell equally well *another* make—especially a new one.

No dealer of respectable standing and experience will act as a sub-agent, buying at a less discount than formerly given him direct, not even from a huge corporation or middleman of any degree of importance.

A satisfied and happy dealer is an asset to any manufacturer, but one full of grievances is a bad advertisement, if not an actual menace.

A satisfied dealer is always a trier, and that means good business.

A manufacturer should always consider the dealer as a valuable part of his selling organization, a friend and helper always, a valuable customer rather than a parasite.

The writer ventures to assert that all the collected experience of years proves that nothing better in selling and distribution of motor trucks has yet been evolved than the "closed territory" system worked somewhat on the following lines:—

1. The appointment of a good reliable dealer in every worth-while district throughout the country with a definitely allotted territory *to work solely* and delineated on a map in the possession of both parties.

2. The dealer so appointed to place a fair contract yearly for trucks, parts, etc., based on experience of sales from year to year. The contract placed to be mutually satisfactory to the manufacturer and agent.

3. The dealer to agree to work his territory thoroughly to make all possible sales, to be at liberty to appoint auxiliaries or sub-agents on his own responsibility and at discretion.

4. Any dealer selling vehicles to customers in another dealer's territory to forego all profits made except 5 or 7½ per cent., as may be agreed, the balance being credited to the dealer in whose territory the vehicle may be sold. This should be rigidly adhered to in all cases, each dealer being fully protected.

5. No manufacturer to sell goods direct, or, if so, to place credit for the full discount to the dealer.

6. The manufacturer to be at liberty to appoint dealer inspectors or field men, who shall assist dealers in every way to improve or increase business, or give any required service assistance to customers. Such manufacturer's travelers or inspectors to spend certain periods in each dealer's territory yearly, mutually in manufacturer's and dealer's interests.

7. The manufacturer to refer all inquiries made at the factory to the local dealer, the latter undertaking to follow up all inquiries to a definite sale or refusal.

8. All dealers to have due notice of coming changes of pattern or model, or reduction of prices. In the latter case the dealer to be credited with the wholesale reduction price on all models left in stock at the time of reduction.

9. The number of various models contracted for, or taken yearly, to be at the sole discretion of the dealer, and according to the requirements of his territory.

Any other details can be mutually agreed upon by the parties, the above being merely the general outline of the system which has ever been found to work well and satisfactorily.

For firms with huge outputs, the writer is of opinion that, outside the "closed territory" system above outlined, there is nothing to surpass the old Ford system of six to ten years ago. This was the system of main dealers, sub-dealers, and limited dealers, and it worked admirably, taken all round. It was a veritable "closed territory" system, but gave everyone a fair chance, inasmuch as the sub-dealers dealt direct and drew supplies from the factory at the same discount as the main dealers, and, what is more, had the same rebates at the year end on quantity taken as the main dealer, except that the latter had a larger rebate, as sub-dealers' sales counted in his total contract and number of vehicles taken. True, it made fortunes for the main dealers, though the sub-dealer did not lose anything. The limited dealership gave the outside dealer a chance to make a sale now and then at a 10 per cent. profit. The system at any rate did not lend itself to price cutting as some present selling systems do.

So far as the manufacturer is concerned, the entire year's output may be fully contracted for by a dozen to twenty mail dealers, which has much to recommend it. On the main dealer, then, lies the onus of getting through, but this is easy with a system of sub-dealers and limited dealers all the while obtaining supplies direct. But this system would be useless without a truck to handle which found a ready sale everywhere.

OLD TRUCK DEALER.

New York City.

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Los Angeles Adopts Refuse Trucks

In the installation of fifteen motor trucks of 2½-ton capacity for the hauling and removal of rubbish and garbage, City Engineer Griffin of Los Angeles has estimated a saving of approximately $25,000 per year over the former private contract cost. Previous to the installation of motor equipment by the city this work involved an expenditure of a sum almost equal to $70,000 per year. The trucks purchased for this work were 2½-ton Garfords equipped with special bodies. The bodies, with a measurement capacity of 10 cubic yards, are arranged with hinged sides, which facilitate easy collection of the load. With the sides dropped, approximately two-thirds of a load can be attained. The sides are then conveniently raised, after which the maximum capacity can be reached. Steps are provided on each side of the body for the lifting and dumping of rubbish cans over the highest point with the least possible effort. Quick discharge of the load is obtainable by means of releasing the tailgates hinged at the bottom at the rear of the body.

The Los Angeles authorities designate certain sections of the city in which the trucks will collect rubbish and garbage on given dates. Boxes containing tin cans and noncombustible rubbish are set near the curb by property owners. Each truck is manned with a driver and two helpers who pick up boxes from the curb and dump the rubbish into the truck as it passes along. In sections of the city where long alleys run between the rear of houses, it is compulsory for the property owners or occupants to place the boxes on a shelf which eliminates the necessity of helpers stepping down, thus saving time in loading. When the trucks are fully loaded, they are driven to a privately owned foundry, backed up to a dump and there unloaded. Through an incline at the dump the tin cans and rubbish slide to an endless belt about 40 feet in length, where broken glass and bottles are segregated, after which the tin and metal are elevated to a bin and pressed into a solid mass about three feet square. These squares are later melted and made into window weights.

35 Lines Using Rail Motors

Nearly $14,000 annually will be saved by the Union Transportation Company of New Jersey through the substitution of motor rail-car equipment for its steam locomotive and coaches. This new equipment will be used on the company's run from Hightstown, New Jersey, where it connects with the Amboy division of the Pennsylvania Railroad to Pemberton, the southern terminus, where connection is made with the main line of the Pennsylvania Railroad.

It is also reported that the use of such equipment by the Narragansett Pier Railroad of Rhode Island has increased the patronage of the company's lines from a monthly average of 10,000 passengers to 26,000. This is a new high mark for the company.

Other railroads that have recently made similar installations of motor rail equipment are the New York, New Haven & Hartford, Great Northern, Cleveland, Cincinnati, Chicago & St. Louis, Baltimore & Ohio, Central West Virginia & Southern, Gilmore & Pittsburgh, Pittsburgh & Susquehanna, and New Mexico Central. In all there are about 35 railroads using the equipment.

The equipment may be used for other purposes besides the transportation of passengers. With a suitably designed body it may be used for carrying freight, baggage or mail. On a level track a speed of 25 to 28 miles per hour can be attained.

This new equipment is not expected to fill the field of the steam passenger train loaded to capacity, carrying 60 to 70 passengers and baggage. Its field rather is in localities where the traffic is thin and spread over the day without pronounced peaks and where scheduled service must be provided irrespective of the volume of traffic.

Milk by Motor Trucks

"The amount of milk hauled to Philadelphia by motor truck increased 400 per cent. above that shipped in 1920, being over 21,000,000 quarts for the year," says Robert W. Balderson, secretary of the Interstate Producers' Association.

"Less than 3 per cent. of our milk now goes into Cincinnati by rail. It is all carried by motor trucks," according to a statement made by H. B. Berning, secretary of the Cincinnati Producers' Association.

New York is said to be preparing legislation for compulsory automobile insurance.

A PAYING INVESTMENT

¶ Do you believe that, in the majority of cases, city merchandise can be more economically transported by power wagons than by horses?

¶ Of course you do.

¶ But do you know the extent of the economy to be gained by the substitution of motor trucks and wagons for horse drawn vehicles?

¶ Few people do.

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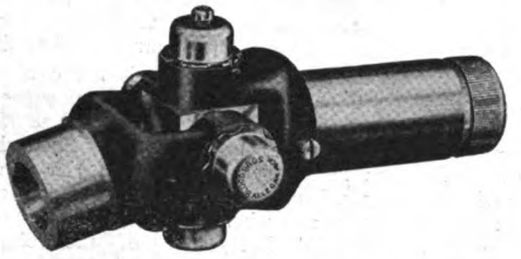

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DRIVE GEARS DRIVE PINIONS

Both at Syracuse, N.Y.

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Chassis Prices: 2-Ton, $3,200; 3½-Ton, $4,350
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Pierce Arrow

WORM-DRIVE DUAL-VALVE
MOTOR TRUCKS

DENBY

MOTOR TRUCKS

Model 33, 1½-2 Ton Bus

Operated by

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SWIFT - ECONOMICAL - POWERFUL

Denby Motor Truck Company
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Sales and Service in all principal cities.

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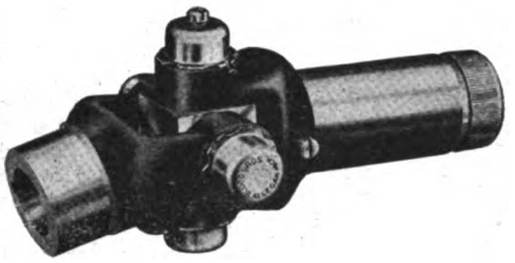

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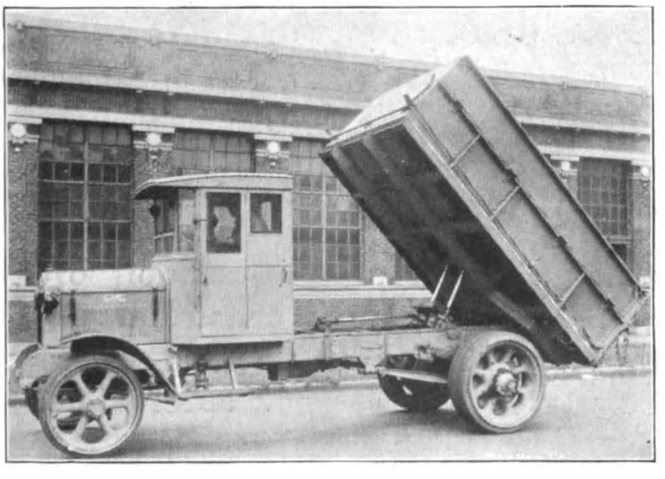

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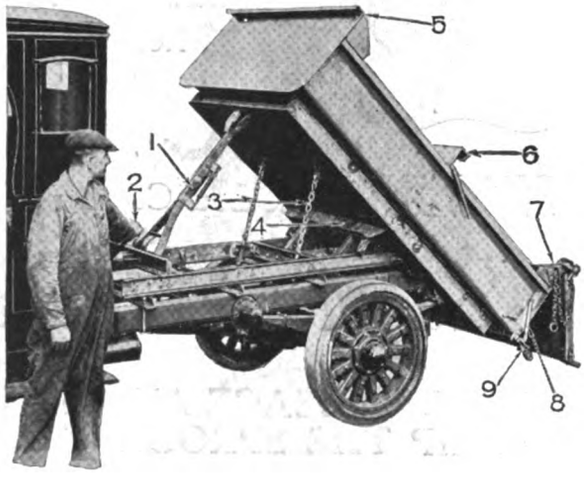
4 **Roller Segment** — rolls on a low track, giving low overall height.

5 **High Dumping Angle**—moves the stickiest material quickly.



6 **Partition**—divides the load for multiple batch hauling. ($25 extra).

7 **Spreader**—lays gravel, stone, etc., evenly and efficiently.

8 **Gate Control** — affords automatic and manual operation.

9 **Lowest Dumping Point** — gives ample ground clearance.

ELIMINATE TRUCK TROUBLES

LEE BODIES eliminate half the total troubles of a dump truck, as it does not use a HOIST with its numerous complicated parts that are subject to improper installation, adjustments and wear, road shocks, vibrations, exposure to dirt, dust, weather, etc., etc.

INCREASE DAILY TONNAGE

The conventional type of mechanical-operated dumping body is a highly complicated mechanism, high in first cost, high in selling price, and high in up-keep expense, and the very quality that makes its production cost unnecessarily high—its great and needless complexity of construction—is the quality that makes it undependable, liable to frequent service interruptions and a source of lasting grief to buyer and seller alike.

SAVE ON FIRST COST

By eliminating the complications inherent in power-operated dumping bodies, an economy in first cost of about 40% has been made possible, while every advantage of these types has been retained without their disadvantages — costs of maintenance and loss of time for repairs, excessive weight and unnecessary high price.

LEE TRAILER AND BODY COMPANY, 2343 S. La Salle Street, Chicago, Ill., U. S. A.

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POWER WAGON

NUMBER 217 CHICAGO, DECEMBER, 1922 Price 25 Cents

DEC 15 1922

Back of every perfected achievement of man-

SPECIALIZATION

THE PANAMA CANAL—50 miles long; 239,000,000 cubic yards of excavation; 5,000,000 cubic yards of cement; 12 locks—in pairs. Built by the nation's specialists made up into many groups performing individual tasks.

The industry's master achievement—the SPECIALIZED Truck

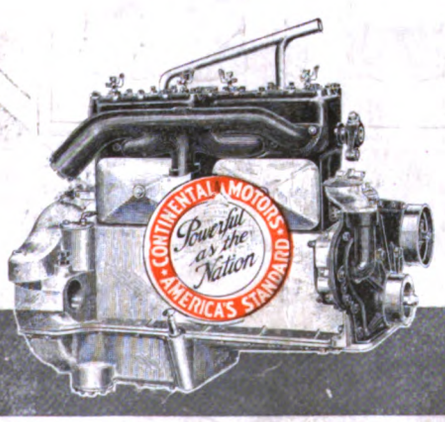
All the good intentions in the world could not have constructed the Panama Canal. It required the bringing together of the SPECIALIZED resources of the nation to complete the task.

Just so the SPECIALIZED Truck builder has brought together highly specialized products—units—manufactured by completely equipped specialist organizations.

The truck-buying public appreciates what it means to have all the major units of a truck—motor, transmission, universal joints, axles and clutch—products of specialist organizations exclusively equipped to make those units. Buyers of trucks also know the advantage of the uninterrupted performance assured by the parts-distributing stations throughout the world, supplying the parts for specialized units.

Benefit by the good will—the *buying* will—of the truck buyer. Identify your organization with a SPECIALIZED truck.

And, in seeing that the truck *is* a SPECIALIZED truck, consider the fundamental unit—the motor. If it is a genuine SPECIALIZED truck you will find upon the crankcase of the motor the well known Continental Red Seal.



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Offices: Detroit, U. S. A. *Factories: Detroit and Muskegon*

Largest Exclusive Motor Manufacturers in the World

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Double-row, deep-groove Conrad type, radial bearing

Angular contact bearing, combination radial and thrust

Double-row, maximum type, radial bearing

Single-row, maximum type, radial bearing

Quiet *and* Smooth Operation

Among other qualifications of a high-grade ball bearing, quietness and smoothness of operation are very essential. These qualities are indicative of correct construction and accurate workmanship.

Strom Bearings are chosen by discriminating manufacturers of high-grade products because of these qualifications.

Our engineers will cheerfully assist in solving your bearing problems.

U. S. BALL BEARING MANUFACTURING CO.

(*Conrad Patent Licensee*)

4541 Palmer Street **Chicago, Illinois**

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Double-acting thrust bearing, flat seats (grooved races) 2100-F Series

Single-acting thrust bearing, flat seats (grooved races) 1100-F Series

Single-acting, self-aligning thrust bearing 1100 Series

Single-acting, self-aligning thrust bearing, leveling washer 1100-U Series

Double-acting, self-aligning thrust bearing, leveling washers 2100-U Series

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There is a message for every motor truck dealer in the fact that many of the largest motor truck users such as Standard Oil, Morris & Company, Armour & Company and national merchants of the same character are big buyers of GMC trucks.

It is an indorsement of the quality and performance of GMC trucks such as could be obtained in no other way than by the actual sale of these trucks to firms having every facility for selecting the best motor truck.

To the retailer of motor trucks this should be proof of GMC quality and of the possibilities that a GMC franchise offers.

GENERAL MOTORS TRUCK COMPANY, *Pontiac, Michigan*
Division of General Motors Corporation

1 Ton $1295 *2 Ton $2375* *3½ Ton $3600* *5 Ton $3950*

Chassis Only—At the Factory—Tax to be Added

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

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THE POWER WAGON PUBLISHING COMPANY

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For 16 Years INTERNATIONAL Motor Trucks Have Made Transportation History

WHILE others have come and disappeared again, International Motor Trucks have advanced steadily to a position among the few leaders in truck sales. Year after year their sound reputation has been passed on from old to new owners. Their popularity is conceded by users. Fleet orders and repeat orders, based on dependability, utility, and low operating cost, are forcing production to new records.

Unusual economies go with International Motor Truck ownership—economies in first cost, performance, and upkeep—the logical result of the Harvester Company's 90-year manufacturing experience.

This Company is fortunate in the possession of a unique field organization capped by 93 branch houses strategically located in principal cities. These have been functioning for years in the interests of the Company's varied activities. Each maintains a completely equipped motor truck service station, in charge of highly trained specialists and road engineers whose single purpose is to safeguard the performance of International Motor Trucks.

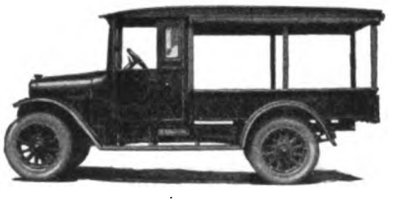
These extensive facilities, linked with the service of thousands of truck dealers, enable us to maintain our Free Inspection Service Policy. This exclusive feature protects all International Trucks with a 4-times-yearly free inspection by factory-trained road engineers. It is of tremendous cash value to owners whose trucks must be kept in continuous hard use.

International Motor Trucks are built in 14 sizes, ranging from the 2000-lb. Speed Truck to the heavy-duty unit of 10,000 lbs. capacity. Special bodies available for every purpose. Mail all requests for information to the address below.

These illustrations show popular types of bodies available with the Speed Truck chassis. Similar styles provided also for all larger models.

Model S International Speed Truck with open express body and enclosed cab. Three-quarter or semi-enclosed cab can be supplied.

Panel stake body with three-quarter enclosed cab. Enclosed or semi-enclosed cab can be supplied with this type of body.



Open express body with full length top and three-quarter enclosed cab. Enclosed cab and side and rear screens available if desired.

International Motor Truck Dealers' Contracts Are Still Available at a Few Points

INTERNATIONAL HARVESTER COMPANY OF AMERICA (INCORPORATED)
CHICAGO U S A

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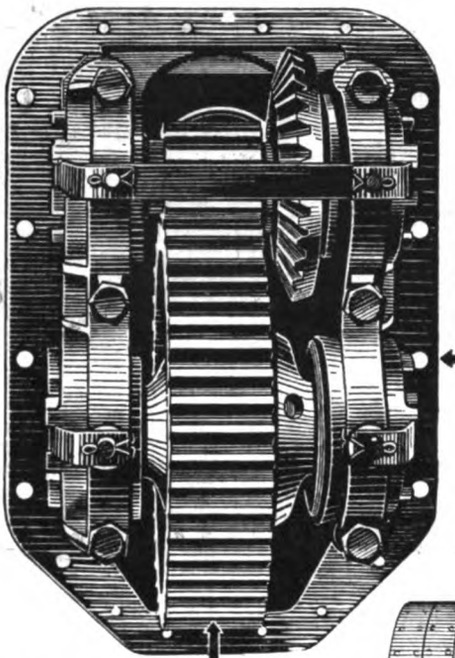
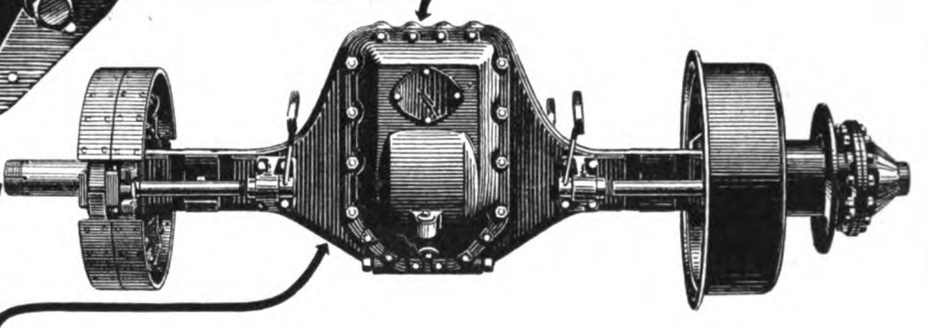
The famous Autocar double reduction rear axle



has proven its value not only to Autocar users but also to truck engineers generally. It is the same double reduction principle used in Autocar construction for 20 years.

Gears all assembled on front cover plate.



Rugged gears of special alloy steels.

Wheels mounted on inserted tube.

Housing cast in two sections.

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Axle housing only carries load.

Axle shaft only transmits power.

All gearing enclosed in center stationary housing.

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Greatest efficiency where pulling is hardest.

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Newark	Syracuse	Wilmington	Allentown	Baltimore	Dallas	San Diego	Fresno
Fall River	Jersey City	New Bedford	Atlantic City	Detroit			Sacramento
							San José

The sturdy **Autocar**

Wherever there's a road

Capacities, 1 to 6 tons
Chassis prices, $1100 to $4350

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POWER WAGON

Vol. XXIX. CHICAGO, DECEMBER, 1922. No. 217.

Parts and Truck Makers Form a New Association

WILL PUSH "SPECIALIZED" TRUCKS

At the recent meeting of parts makers and truck assemblers though the medium of the National Association of Motor Truck Industries plans for the unification of their efforts toward the promotion of the assembled vehicle idea were discussed. As a result the name of the organization will be shortened to Motor Truck Industries and the management henceforth will be in the hands of Martin L. Pulcher, vice-president and general manager of the Federal Motor Truck Company of Detroit and a board of directors composed of nine truck makers' and six parts makers' representatives.

The association will have for its principal object the furtherance of the sale and use of assembled trucks and it is possible that a merchandising manager may be employed to perfect a general standard selling plan similar to that adopted by the Automotive Equipment Association.

Among the subjects discussed were the financing of dealers by the truck makers and the difficulties that have arisen from the handling of contracts and commitments during the recent period of inventory deflation. It is felt that misunderstandings of that nature will be eliminated hereafter through the better contact developed by the association.

The following representatives of the truck and parts makers participated in the discussions:

M. H. Pulcher, Federal Motor Truck Company; J. W. Stephenson, Indiana Motor Truck Company; H. T. Bouldin, Selden Truck Corporation, and J. F. Bowman, Garford Motor Truck Company for the former Fred Glover, Timken-Detroit Axle Company; George W. Yeoman, Continental Motors Corporation; G. E. Wilder, Gemmer Manufacturing Company; C. A. Dana, Spicer Manufacturing Company; A. E. Parsons, Brown-Lipe Gear Company; L. M. Viles, Buda Company; C. C. Hinkley, Hinkley Motors, Inc., and W. L. Horning, Waukesha Motor Company., for the latter.

'Bus Owners Unite

The National Motor Transport Association was formed November 17 when representatives of 'bus companies from all parts of the country met in the Hotel Pennsylvania, New York City. The object is to promote closer co-operation among companies operating 'bus lines to the end that there will be better 'bus transportation throughout the country. Patrick Healey, Waterbury, Connecticut, was elected president; W. E. Travis, (California), R. E. McCollum (Columbus, Ohio) and W. P. Killeen (Washington, D. C.), were named vice-presidents; Alexander Spring (Waterbury), treasurer, and E. N. Burritt (New York), manager. Burritt was formerly manager of the American Electric Railway Association and is well known in transportation circles.

October Truck Output Higher

Figures received by the Department of Commerce through the Bureau of the Census show a marked increase in the production of both trucks and passenger automobiles in October, compared with September. The total production of passenger-cars in October was 217,098, compared with 187,125 in September, while truck production in October amounted to 21,416, as against only 18,656 in September. In October, 1921, production totaled only 134,734 passenger-cars and 12,813 trucks.

The low figures for September this year were partly, although not entirely, accounted for by the closing of the Ford factories for a part of the month.

The following table gives the total production for each of the last four months, with corresponding figures for the same months of last year. With a few exceptions, the reports each month are from identical firms and include approximately 90 passenger-car and 80 truck manufacturers. October figures are subject to slight revision when all reports have been received.

	Trucks		Passenger-cars.	
	1922.	1921.	1922.	1921.
July	21,357	10,766	224,057	165,574
August	24,200	13,080	249,225	167,705
September	18,656	13,648	187,128	144,669
October	21,416	12,813	217,098	134,734

Autocar Prices Raised

The Autocar Company has announced a price increase on all truck models to take effect December 11. The new prices will be as follows:

	Old Price.	New Price.
Short Wheel-base Models.		
4-ton	$3,950	$4,200
2-ton	2,950	3,100
1½-ton	1,950	2,200
Long Wheel-base Models.		
4-ton	$4,100	$4,350
2-ton	3,075	3,200
1½-ton	2,050	2,300

Grant Making Trucks

Finding the truck business exceptionally good, Joseph C. Hostetler, receiver of the Grant Motor Car Company of Cleveland, has temporarily discontinued the manufacture of passenger-cars to concentrate on the production of trucks. An inventory and appraisal are now in progress.

Some Fear Large Output Presages Overproduction

YEAR IS RUNNING AHEAD OF 1920

An unprecedented volume of motor vehicles output is creating in the minds of a conservative element in the automotive industry some fear of the possibility of overproduction. October's turnout of approximately 244,000 cars and trucks was at the rate of nearly 3,000,000 annually—at a season when demand is expected to fall off substantially. The October, 1921, output of 147,500 vehicles was at the annual rate of 1,770,000 and the 1920 corresponding month's turnout of 150,000 machines at the rate of 1,800,000.

For first ten months this year aggregate production of passenger-cars and trucks exceeded 2,117,000, within 116,000 of the full year 1920 record of 2,205,197 vehicles. With Ford alone planning to build 100,000 machines in November, a new record output this year is certain. If November's aggregate output is 200,000 and December's 150,000, the total for this year will exceed 2,467,000 and exceed 1920 by more than 262,000.

The following tabulation shows passenger-car and motor truck production from 1911 with 1922 partly estimated by certain elements in the industry:

	Passenger-Cars.	Trucks.	Combined.
*1922	2,220,660	246,740	2,467,400
1921	1,514,000	154,550	1,668,550
1920	1,883,158	322,039	2,205,197
1919	1,657,652	316,364	1,974,016
1918	926,388	227,250	1,153,638
1917	1,740,792	128,157	1,868,949
1916	1,493,617	90,000	1,583,617
1915	818,618	74,000	892,618
1914	543,679	25,375	569,054
1913	461,500	23,500	485,000
1912	356,000	22,000	378,000
1911	199,319	10,655	209,974

*Estimated.

One of the reasons for October's high production is the fact that because of the coal shortage and rail transportation congestion, operations in September were hampered. A good part of October output represented unfilled orders from the preceding month.

Another factor of considerable importance is the wider buying field tapped by establishment of new low prices by Ford and other manufacturers. An estimate that hundreds of thousands of new potential buyers have been created by the reductions made this year appears borne out by the fact that following the recent Ford cut incoming orders were increased by nearly 500 a day.

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Chicago 'Bus Company Gets Permit to Extend Service

500 MACHINES WILL BE OPERATED

Pledged to a "no straphanging" policy, the Chicago Motor 'Bus Company will extend its service to the south side within six months, under authorization granted by the Illinois Commerce Commission. The Commission denied a similar petition filed by the Depot Motor 'Bus Company.

The Chicago Motor 'Bus Company was given permission to extend its service over 35 miles of territory on the south side. John Hertz, president of the Yellow Cab Company, who recently reorganized the 'bus company, has pledged the 'bus line to an expenditure of $3,500,000 in development of its facilities.

John A. Ritchie, former president of the Fifth Avenue Coach Company of New York, has promised to make Chicago the "'bus capital" of America.

The Illinois Commerce Commission in 1919 rejected a petition of the Chicago Motor 'Bus Company for a certificate of convenience to operate on the south side, but was overruled by the supreme court.

The south side routes, over which a fleet of from 40 to 50 'buses will ply within a few months, according to company officials, are, in general, as follows:

Michigan Boulevard from Oak Street to Garfield Boulevard; East 72nd Street at the South Shore Drive, along Marquette Road to Marquette Park; Loomis Street between Marquette Road and Garfield Boulevard; Normal Avenue between Marquette Road and Garfield Boulevard; the Midway Plaisance; Jackson Park Boulevard; Washington Park along Garfield Boulevard to Gage Park; Grand Boulevard and South Park Avenue; Hyde Park Boulevard to Drexel Boulevard, to Oakwood Boulevard and Grand Boulevard.

The manufacturers of the 'buses will be undertaken by the Yellow Coach Manufacturing Company, a new organization formed for that purpose by Mr. Hertz and John A. Ritchie and George A. Green, former executives of the Fifth Avenue concern.

All but a few of the present heavy 'buses will be scrapped, and their places taken by 300 modern coaches of a design originated by Mr. Green. It is expected that soon after the inauguration of this new service, it will be necessary to increase the fleet to 500 'buses.

Production of the new vehicles is to start early next year and, in preparation for this, an addition will be built to the present Yellow Cab factory. It is expected that by April the Yellow Coach Manufacturing Company will be producing two coaches a day. The capacity of the plant will be four daily and this, it is thought, will be reached before the end of 1923. Although a considerable proportion of the first production is expected to go for use in Chicago, President Ritchie declares he will start building up a sales organization for the merchandising of the coaches and the method of operation throughout the country.

There will be two types of coaches, both of which will be driven with specially designed Moline-Knight engines. A double-deck low-level coach, with a crew of two men and with a seating capacity of 68, will be operated over the trunk lines leading from the residence sections to downtown. On outlying boulevards which serve as feeders to the main line a large limousine type will be operated. This also is designed for interurban use. Completely inclosed and seating 25 passengers, the limousine coach will be operated by one man and passengers will pay as they enter. The double-decker will weigh about 11,000 pounds and the limousine coach about 6,300 pounds.

The double-decker is to be similar in design to that used by the Fifth Avenue Coach Company in New York. It will not be an exact duplicate, however. Mr. Ritchie says that in designing this new vehicle the best 'buses and motor coaches in the world, including those of the General Omnibus Company of London and the Fifth Avenue Coach Company of New York, have been studied critically and the best points of all have been embodied in the new design.

Plan for Military Roads

Road development needed for national defense as planned by the General Staff of the army has recently been indicated to the Department of Agriculture by the Secretary of War and the information has been placed in the hands of the engineers of the Bureau of Public Roads who are at present getting into final shape the plan for the system of federal-aid highways. This system will consist of approximately 180,000 miles of road, so laid out as to serve all parts of the country and will be built by the states in conjunction with federal aid.

The General Staff has been investigating the subject since 1919, the Bureau of Public Roads collaborating. Briefly summarized, the report made is as follows: There are certain vital areas along the boundaries of the United States against which any invasion will probably be directed. These areas have been outlined by the General Staff. For military purposes they should be connected with the centers of production and storage and industrial centers. The roads will then become strategic lines of supply and will usually conform with roads located for other purposes. Transcontinental routes are of no particular value for military purposes.

The plan submitted by the War Department shows important centers that should be connected but does not give detailed routes. Engineers of the bureau state that these points can be connected by roads without any serious dislocation of the plan of development for other purposes and that, in general, the military need for roads conforms with surprising closeness to the commercial and economic needs. It is thought that the plan submitted can be embodied in the federal-aid highway system. Roads of a purely military nature such as those leading to coast fortifications have not been included in the plan submitted and will be handled by the War Department as heretofore.

Industry Should Operate at Near Capacity in 1923

WHEEL MAKER SEES BIG DEMAND

Complete recovery of the motor truck industry from the tag-end period of post-war depression is predicted for 1923 by C. C. Carlton, secretary of the Motor Wheel Corporation, of Lansing, Michigan. By virtue of its position as builder of truck wheels, the Motor Wheel Corporation is enabled to exercise close observation of conditions prevailing throughout the truck industry and to forecast effectively the business trend.

"Motor truck manufacturers are preparing, practically without exception, for greatly enlarged production," says Mr. Carlton, "conclusive evidence being offered in the form of increased commitments for all classes of material. The stabilizing influence of general business revival, restoring confidence among users of truck equipment, and ripening the decision to purchase needed trucks and supplies, is creating a demand that will enable the truck industry in 1923 to operate at nearly full capacity. The revived demand will be for all classes of trucks, though there will be an especially large market for trucks of the general purpose variety, designed to carry medium loads at comparatively high rates of speed. The utility of this type of truck has been amply demonstrated in countless lines of work, with the result that it is coming more and more into favor."

GMC Sales Plan

As a means of increasing the coöperation between the factory and the dealer the General Motors Truck Company has created four divisions under the sales department to assist truck salesmen in all sections of the country. The four new divisions come directly under the supervision of the sales promotion manager and are, in turn, supervised by experts in truck statistics and sales.

The new divisions are the loose materials, 'bus, highway engineering, and statistical. The loose materials division is that in which dealer and factory problems in the hauling of sand, gravel, ashes, garbage and any other article which can be dumped are worked out. The 'bus division is that where figures are prepared and problems worked out in the marketing of 'bus chassis for school work, interurban and city transportation.

The highway engineering division will work out demonstration problems and dealer's questions. A function of this department is to help the dealers and distributers in closing sales either through the use of literature or by personal factory representation. The statistical division will gather figures on motor truck registration and many other subjects of help to the dealers. The executives believe that with these divisions the organization will be equipped to handle almost any sales problem which may arise in any field.

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Fenn Finds Truck Business Approaching Great Activity

SEES LARGE 'BUS AND FARM DEMAND

In speaking of the truck situation, F. W. Fenn, secretary of the National Motor Truck Committee of the National Automobile Chamber of Commerce, says, as a result of an extensive trip:

"General business is the barometer of the truck industry. When business is good we will sell trucks and lots of them, and I am glad to report that business is coming back. There is a labor shortage in all the industrial centers, the demand for trucks is surprising everyone and new markets are opening for us which tell us that we are just scratching the surface right now.

"I find a great demand for rail cars. The railroads are coming into the market and not only want these rail cars but also need trucks for short hauls and for store-door deliveries. The carriers are finding that they must either take to the motor trucks and store-door deliveries or spend millions building new terminals on the outskirts of the big cities. The electric railways, too, are proving good customers through frankly taking up the motor 'bus as a feeder to their main lines. The boom in highway building also has helped matters.

"Of great benefit to the industry is the decisions of the public service commissions of New York and California, which have held that trucks and 'buses are necessary to the public and have granted franchises for the operation of 'buses despite the protest of the trolleys.

"I also feel that the farmers are going to prove mighty good customers. As soon as they sell their crops and get some ready money, I think we are going to hear from them in a substantial way.

"In my swing through the country I found everyone busy and very optimistic. Mack, Federal and White are going strong. At Diamond T I found great activity because of the fact that the American Railway Express is taking most of the output. Four-Wheel-Drive at Clintonville is building flanged wheel trucks for use on the railroads of Porto Rico, Japan and China. Its foreign business is good.

"Graham at Detroit has announced a complete line of bodies for smaller haulage work, which has met with great success. The Graham is powered with Dodge engines and distributed by Dodge Brothers dealers. The Walker electric at Chicago reports many orders and great activity in the sales department, while the Watson Wagon Works at Canastota, New York, is doing so well that it has discharged the receiver who has been at the helm for some time."

Gramm Gets Friendly Receiver

B. A. Gramm and Max Bernstein, respectively vice-president and general manager and president and treasurer of the Gramm-Bernstein Motor Truck Company, Lima, Ohio, have been deputized managers of that concern by E. G. Kirby, Toledo banker, who has been appointed receiver by federal court order. The move is the outgrowth of a suit in equity designed to protect the interests of some 95 per cent. of the concern's creditors, who have assented to a reorganization plan, which, in turn, is an outgrowth of the depression in the truck business of the past 18 months. The minority of non-conforming creditors have started a suit of their own, and the receivership action will have the effect of forestalling seizure of the property should their action prove successful.

A. E. Shafer, general sales manager, in a letter to dealers says:

"The severe depression, with its accompanying deflation, made it necessary for us, in common with many others, to write off large shrinkages in inventory and for other causes to get back to bed rock manufacturing conditions for the future. We are nevertheless pleased to say, with that done, our balance sheet still shows substantial figures on the right side of the ledger.

"We have realized that to put ourselves in the most favorable position to seek and secure the large volume of truck business now plainly in sight for next year and beyond it would be necessary to effect a financial reorganization. Plans for doing that have been under way for some time and had progressed so favorably that fully 95 per cent. of our creditors have assented. There was a small minority who, seeking special advantages for themselves, were inclined to act "the dog in the manger," willing and ready to upset the plans of the big majority.

"Desiring to proceed to the earliest consummation of our plans, we yesterday invoked the Unied States Court to grant a friendly receiver in equity for the company, so as to preserve the interests of all and, with that done, we now feel that we can work out our plans in the least time and without interference of any kind.

"We wish to assure you that all departments of manufacturing, sales, service, advertising, etc., will operate uninterruptedly as before to the end that we may be able to complete all our plans at the very earliest date, for a larger and stronger company. We bespeak your continued hearty coöperation and support.

Of the authorized $5,000,000 capital stock $2,302,482 is outstanding. The company's balance sheet as of December 31, 1921, shows the land, plant and equipment valued at $1,131,563; good will, patents, trade marks, etc., at $429,103; notes and cash receivable, $625,834; inventories, $1,807,414; deferred charges, $42,342; cash, $8,104. In the way of liabilities there were: capital stock, $2,302,482; 7 per cent. serial gold notes, $450,000; notes payable, $941,267; accounts payable, $167,544; taxes accrued, $30,774; due officers, $18,644; reserve for interest, $21,463; dealers' deposits, $21,094; surplus, $91,092; total, $4,044,360."

The officers of the company are: Max Bernstein, president and treasurer; B. A. Gramm, vice-president and general manager; H. O. Bentley, secretary; Willard J. Gramm, chief engineer, and A. E. Shafer, sales manager.

Glover Succeeds Demory as President of Timken Axle

ALDEN MADE CHAIRMAN OF DIRECTORS

Following the recent announcement of the resignation of A. R. Demory from the presidency of the Timken-Detroit Axle Company, effective December 2, the trade in general will be interested in learning of the appointment of Fred Glover as president. The only other change made is that of chairman of the board of directors to which position H. W. Alden has been appointed.

Mr. Glover became associated with the Timken organization in July, 1919, as vice-president and general manager, coming from Washington where he had been chief of the Motor Transport Service and later chief of the Motors and Vehicle Division, P. S. & T. in charge of procuring all automotive equipment for the army. Prior to his work in Washington he was vice-president and general manager of the Gas Traction Company of Minneapolis from 1907 to 1912. When this company sold its holdings to the Emerson-Brantingham Company, Mr. Glover joined the new organization as vice-president, remaining with it until 1918 when he was called to Washington. Fred Glover's ability in efficiently handling the settlement claims of hundreds of passenger-car and truck manufacturers at the close of the war is well known throughout the industry and his executive ability and business training ably fit him to direct the large and increasing business of the Timken company.

H. W. Alden, who is well-known throughout the trade and the engineering profession, has been with the Timken company for seventeen years and in the motor-car field since 1895. Since the organization of the Timken-Detroit Axle Company in 1909 he has been in complete charge of design and engineering and to his ability and foresight is due much credit for the success of the Timken product.

Executives of the Timken company express complete confidence in the future of the automotive industry. The actual orders already received by the Timken-Detroit Axle Company from both passenger-car and truck builders, togethers with several new contracts just closed, show every indication of an increased volume of business for 1923. While no one can forecast the future with absolute accuracy, the Timken company anticipates a volume upwards of $24,000,000 during the coming year.

Harroun with Marvel Carbureter

Ray Harroun, former international race champion, who has been for several years prominent as an automotive engineer, has joined the organization of the Marvel Company in Flint, Michigan, with combined responsibilities in executive engineering and sales. The Marvel Company, which has heretofore served as source of carbureter supply only a limited number of large manufacturers, is inaugurating a plan of expansion which the increased facilities of its new plant make possible.

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American-LaFrance

Commercial Trucks

to Establish New Hauling Records

American-LaFrance engineers have long been famous for producing automotive products that establish records.

Over a period of fifteen years they have produced American-LaFrance Motor Driven Fire Apparatus—known the world over for its power and stamina as a result of the standards it has set for distances run, longevity of service and continuous hours it has pumped.

American-LaFrance quality can never be lowered. Our new Commercial Truck must be worthy of its name. It is built with the same thoroughness as American-LaFrance Fire Apparatus. Every part is constructed with a view toward making American-LaFrance Commercial Trucks establish new hauling records.

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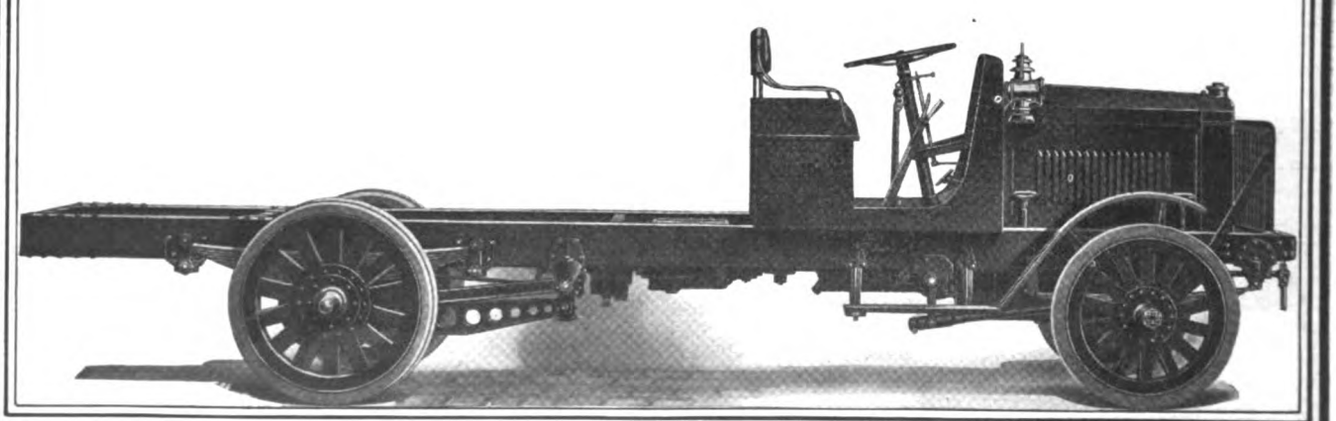

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POWER WAGON

An exponent of the most enlightened thought and practice of the motor truck industry.

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Urban Passenger Transport

IN spite of the rapid increase in the use of motor vehicles disclosed by production and registration figures, the alarming congestion that has naturally and inevitably followed has not been apparent to most people, because its growth has been gradual and continuous and, for that reason, generally unobserved. They are certain to be somewhat jolted, therefore, when our municipal traffic authorities, such as Police Commissioner Enright of New York City, admit that they are unable to cope with the traffic problem of the modern large city and state that, unless some immediate relief is forthcoming, the business which has been largely developed by the motor vehicle will be handicapped by it.

The remedy, we suspect, is to be found in a more intelligent and efficient use of the streets which are our chief traffic lanes. But here most large cities are sadly hampered through having allotted at least one-third of certain downtown streets to the uses of the street-railway company, which, while having presumably a private right-of-way, really has nothing of the sort, its operations being hindered at every point by other vehicles not confined to fixed lines of travel. Where alternative means of transport are available, the great bulk of long-haul traffic falls to the high-speed systems, such as the elevated and the underground railways, these being able to provide rapid express service because of their real right-of-way privileges. In such cases the street-cars are nothing more than short-haul traffic carriers, and this, indeed, is their most profitable field of operations. Yet, at the same time, this is the very field to which, because of their inflexibility, they are least suited. Short-haul traffic in areas of great congestion can be handled efficiently only by vehicles that are free to adjust themselves to the fluctuations in that congestion and which, through their flexibility, are able to relieve congestion instead of aggravating it.

This is, of course, rank heresy in the eyes of the street-car men, yet they can not fail to be aware of the logic of the situation, since every day's operations supply physical evidence of the truth of the view presented. One has but to observe street traffic in large cities from an elevated position to obtain first-hand information of the ultimate form city transportation must take. The tendency is unmistakably in the direction of greater speed and flexibility and in such a development the street-car does nothing but obstruct. In outlying sections its unsuitability for modern street transportation is not so noticeable—congestion being a problem in prospect rather than in evidence—but in the congested centers of metropolitan areas, such as those of New York and Chicago, the street-car has become, through the very nature of its roadbed, a public nuisance. Surrounded with rapidly growing, rapidly moving and rapidly changing traffic, it remains tied to inflexible rails and an invariable route. In such circumstances only a vehicle that has been developed concurrently with that change in traffic is entitled to bid for public patronage on short journeys. The motor 'bus is the one vehicle that can meet the demands of the situation without exacting the heavy toll in money and time now being borne because of the street-car's inability to fit in with modern transport conditions.

That this situation is understood in electric railway circles is shown by the observation of one of the most prominent interurban electric railway executives in the country. He estimated the profitable life of electric street-railways, under present conditions of motor competition, at five years, while to interurban properties he granted ten years. A decade hence, he claimed, motor 'buses and private motor cars will have absorbed all local traffic and the steam railways will have monopolized through travel. For our part, we can not see the picture in quite such dark colors, but we do believe that the street-railways in our largest cities have seen their best days and that their security and usefulness are now decidedly on the wane.

"A Piddling Trade"

THERE is not much occasion nowadays for speaking of horses, for their elimination from city life, like the growing use of motors, is progressing so gradually and continuously that definite signs of the change are hard to find. At times, however, one hears that the business of breeding, using and caring for horses is becoming increasingly unattractive from a financial standpoint, and when that point is reached, the end may be predicted with more than a mere show of confidence. *The Breeders' Gazette*, speaking of the market for horses, says that "order buyers report considerable inquiry, but . . . prospective buyers are disposed to wait. Values are 10 to 25 per head lower than a month ago, and it is a piddling trade at that." A traveling delegate of the Horseshoers' Union reports that there are only two apprentice horseshoers in New York City, and at a recent farm sale the highest price received for any one of eight horses was $28.50, while a crate of chickens brought $31.50. Yet in the face of such evidence one of the leading statistical organizations has suggested that farmers raise more horses to consume more of the oat crop to raise the price of oats. In such various ways is one made acquainted with the growing unimportance of the horse in business.

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"Transportation Greatest Factor in Civilization"

CONFIDENCE IN ESTABLISHED MAKERS

"The paramount lesson learned by the automotive industry in 1922 is the fact that ours is the first industry in the world, and that it arrived there because transportation is the greatest factor in our growing civilization and progress." This view, presented by H. L. Horning, general manager of the Waukesha Motor Company, Waukesha, Wisconsin, indicates the main trend of a survey just completed by the Motor & Accessory Manufacturers' Association. This national organization embraces 420 companies making parts, units and equipment for the automotive industry, and the results of its questionnaire, now made public by General Manager M. L. Heminway, are therefore regarded as authentic.

Most of the replies to the association's question as to the most significant lessons of 1922 came from important executives in all branches of the trade. In addition to the opinions expressed by the parts manufacturers themselves, the attitude of the vehicle manufacturers was summarized in two brief but important statements:

"The big lesson learned by the industry in 1922," said Alfred Reeves, general manager of the National Automobile Chamber of Commerce, "was that the American people will demand motor transportation in large numbers, irrespective of the condition of the general business and, further, that it paid the industry to lower its prices, bringing its product down to the level of the lower purchasing power of the American public."

From A. R. Erskine, president of the Studebaker Corporation, South Bend, Indiana, came this interpretation: "The public is determined to have automobiles if it is possible to get them, regardless of general business conditions."

Public confidence in well-established, well-managed companies furnishing quality products and adequate service is another factor stressed in many of the replies. Keen competition, although crucial to concerns that can not meet these standards, serves to strengthen those companies legitimately deserving trade and public confidence.

Almost all the executives point out that the industry, through the reduction of prices and through the perfection of producing efficiency to meet real transportation needs, is to-day on a sound, stable basis, having successfully come through the periods of boom, deflation, and readjustment. The safe and sane level has now been reached.

"The main lesson learned by the automobile industry," says a representative accessory manufacturer, "has been the value of economical production. Cars and accessories are becoming standardized and, through competition, the list prices are getting about where they should be."

"Lower prices mean increased sales volume," is the laconic reply of another.

Other representative opinions of equipment and accessory manufacturers follow:

"The public can not be fooled. The industry is stable."

"The medium-priced car is going to be increasingly more popular."

"The public wants a complete motor car. We are gradually reaching the point where an automobile delivered to a buyer will be as complete as any other article of utility. This will be a wonderful thing for the accessory manufacturers."

"Nineteen hundred twenty-two has taught the necessity for the most accurate control of inventories, commitments and markets. We feel that the industry is much better fitted to weather any further storms. This applies both to car manufacturers and accessory and parts makers."

Asked for the automotive moral of 1922, one manufacturer replied crisply: "When Ford takes snuff, the automotive world sneezes."

Additional features of this annual survey of the Motor & Accessory Manufacturers' Association covering the outlook for 1923 with respect to markets, finance, design and equipment will be announced shortly.

Cab Mounting Dimensions

Early last spring it was decided to undertake the standardization of motor-truck cab mounting-dimensions as it was considered important to make possible the production of stock cabs in order that users might not be obliged to have cabs specially designed with the resulting loss of time and added cost. Information was obtained from truck builders as to the mounting dimensions required for cabs used on their trucks, this information being tabulated and a tentative recommendation based thereon. The recommendation was reviewed at the last meeting of the Truck Division of the Standards Committee of the Society of Automotive Engineers, together with comments which had been obtained from truck and cab builders and as a result the recommendation was revised in some details.

The table of dimensions shown below was approved by the division members subsequent to this meeting and will be submitted at the Standards Committee meeting for adoption as S.A.E. Recommended Practice. Copies of the report will be sent to all Society members and others interested in order that comments may be submitted prior to the Standards Committee Meeting.

Dimension.	1- to 2½-Ton Trucks.	3- to 5-Ton Trucks.
Front of dash to back of cab	46"	46"
Bottom of seat to top of cab	48	48
Bottom of seat to lowest part of cab top.	41	41
Front to back of seat box	20	20
Floor to bottom of seat	14	14
Frame top to top of floor	3½	4
Frame top to lower edge of windshield.	35	39
Overall width of cab.	48	56

Where cab sides, doors or side curtains are used, care should be taken that the driver's vision is interfered with as little as possible.

M. Herbert Beary has been appointed special factory representative of the new Bethlehem Motors Corporation. He is a man of wide experience and acquaintance in manufacturing and banking circles, and will make his headquarters in Kansas City, Missouri.

Growth in Truck Use Has Outstripped Car Record

TRANSPORT EXPANDS IN DEPRESSION

The magnitude of the motor truck industry is little understood by the average person, due principally to the large number of automobiles now found on the highways. This is the opinion of M. L. Pulcher, vice-president and general manager of the Federal Motor Truck Company of Detroit, who cites figures as to the growth of this industry to prove his assertion.

"Since 1913 and up through the present year the motor truck industry shows a growth of 1,540 per cent. as compared with a total of 715 per cent. for the automobile industry," Mr. Pulcher says. "The truck industry is just beginning to hit its stride, and in the next decade surprising things may be expected. Figures now available show that in 1913 there were 64,000 motor trucks registered in this country; in 1914 there were 85,000; in 1915, 140,000; in 1916, 198,000; in 1917, 289,000; in 1918, 433,000; in 1919, 749,000; in 1920, 975,000; and in 1921, 1,050,000. These figures show that it was vital factor in the business life of the country."

Passenger-car registration, Mr. Pulcher points out, increased from 1917 to 1921 a total of 96 per cent., while during the same years truck registration grew from a small total to an increase of 263 per cent. as compared with the automobiles.

"These figures show," Mr. Pulcher says, "that during the last four years the number of trucks in daily use throughout the country has increased nearly three times as fast as in the case of passenger-cars, in spite of the fact that during eighteen months of this period the worst business depression of the decade was encountered."

Bessemer Truck in Merger

Plans for a merger of the American Motors Corporation of Plainfield, New Jersey, and the Bessemer Motor Truck Company, of Grove City, Pennsylvania, have been completed and await only the approval of stockholders to become effective. The consolidated company will be known as the Bessemer-American Motors Corporation, and will have a capitalization of $2,000,000 8-per cent, participating preferred stock and 200,000 shares of common-stock with assets in excess of $3,000,000.

It is understood that the same interests that have been identified heretofore with the management of the two companies will continue in charge of operations but that there will be a general consolidation of activities in both organizations with a consequent reduction in expense and increase in efficiency and economy.

The Bessemer Company was established more than ten years ago. It puts out a complete line of trucks in 1, 1½, 2½ and 4 ton sizes. The company maintains two plants located in Grove City and Philadelphia, but, following the merger, it is stated, operations will be consolidated at the Philadelphia plant.

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Credit Conditions Will Be Better, Say Parts Makers

WEAK CONCERNS WILL BE ELIMINATED

A continuation of keen competition in the automotive industry during 1923 will strengthen the well-established, well-financed and well-managed companies, but will put many of the weaker ones to the final test. This is the outstanding conclusion of a survey just completed by the Motor & Accessory Manufacturers' Association among its 423 members who are the principal makers of parts, units and equipment for the automotive industry.

Unremitting vigilance in granting credit, optimism tempered by caution, and prudence qualified by forward-looking faith in the dynamic progress of the automotive industry—these are salient ideas stressed by the directors and financial executives who sent their views to M. L. Heminway, general manager of the association. The symposium is based on replies to this specific question: "What, in your opinion, is the automotive outlook for 1923 with respect to finance and credit?"

Representing the vehicle manufacturers, A. R. Erskine, president of the Studebaker Corporation, said:

"The outlook is most encouraging. I believe the volume next year will equal if not exceed this year."

According to Alfred Reeves, general manager of the National Automobile Chamber of Commerce, a few of the car manufacturers may have some difficulty, but on the whole the credit and financial outlook is good. He points out that arrangements are being made with 22,000 bankers throughout the country to get credit for dealers, particularly in the carrying of floor stocks, while more and more finance companies are entering the field to handle the retail sales.

"In general," says G. Brewer Griffin, manager of the automotive department of the Westinghouse Electric & Manufacturing Company, and a director of the association, "we are watchfully optimistic regarding the automotive vehicle business for 1923, as the general business of the entire country promises to be better than during 1922. Most cars sold this year have been sold in cities and large towns. It is thought that the small towns and farmers will begin to buy shortly after the first of the new year. Many vehicle manufacturers seem to believe that unless they and their distributors accumulate a stock of cars this fall and winter, there will be a shortage against spring demand. If this view has a foundation in fact, then we believe that there will be no difficulty in financing the business. But dealers must be careful not to overextend their credit capacities by sales on too low initial payments and too long time payments, if the support of the local banks is needed or expected. There is a danger to the dealer in selling cars to 'good moral risks' who have no fixed income, unattached real estate, or nothing beyond a small salary or wages. All paper taken by dealers should have at least one good endorsement."

According to many representative parts manufacturers, 1923 will be the final test of financial strength for small automobile manufacturers. "It is our opinion," says a leading carbureter manufacturer, "that the finances of the better companies will improve during the first six to nine months of the year 1923, and on the other hand we will not be surprised if some of the companies who are not well financed find it necessary to drop out. Whether they will discontinue doing business or will be absorbed by some of the larger companies we can not say, but we assume that there are so many machines on the market to-day that the manufacture of some of them could be discontinued without having a bad effect on the industry."

Similar views are expressed by many other unit manufacturers and suppliers of raw material who are in close touch with the basic conditions in the industry, but they all agree that this does not represent a pessimistic outlook for the trade as a whole. Furthermore, it is pointed out that many small concerns, with a sound product and a strong clientele are not necessarily weak because they happen to be small. Some small concerns are in better shape financially than several of their larger competitors. In the main, though, the outstanding vehicle manufacturers in the principal price divisions are making sharp inroads on the business of the smaller manufacturers through economies in production and distribution.

One of the largest parts manufacturing concerns in the country has this to say: "Finance and credit will be on easier footing than in 1922 due to the remarkable performance of the industry. It will carry into the year of 1923 the conviction to bankers and financiers that the automobile industry is on a sounder and more popular basis than ever before."

Vehicle makers who do not give excellent value for the money will have a difficult time, say many executives. In general, 1923 will be a year calling for viligant work on the part of credit managers. A representative Detroit parts manufacturer sums up the situation thus:

"There is a feeling among financial men that the next few years are going to bring very strong competition among automobile companies and therefore the financial men will have to be very careful in giving credit for, while some will make large profits, many will fall by the wayside. This condition will not change until business has really cleared itself of practically all weak concerns and is in the hands of a few strong companies."

"Most of the weak sisters have already been eliminated," says a Cleveland accessory manufacturer, "and the few remaining ones will be either refinanced on a sound basis or eliminated from the field by the force of competition, thus leaving the industry as a whole in better shape," or, as another manufacturer expresses it, "those vehicle manufacturers now in good financial condition will show a steady improvement and those not at the top will probably fall back."

Uniform Tariff Treatment Is Winning Favor Abroad

LOWER DUTIES BEING CONSIDERE

Sentiment in favor of uniform international tariffs on motor vehicles is gaining ground abroad, in the opinion of H. H. Rice, treasurer of the National Automobile Chamber of Commerce, who has just returned from the other side. Mr. Rice talked with many leading motor vehicle manufacturers and dealers in Europe and Great Britain. He found that the new American motor tariff offering lower duties to those countries which favor the United States is creating a receptive attitude abroad. A good deal of protectionist sentiment remains, to be sure, but lower duties for United States automotive products are being seriously considered in many quarters.

Spain, Italy, Belgium and Holland have already benefited from the new motor tariff. Formerly the United States duty was 45 per cent. on automobiles costing over $2,000, but it is now as low as 25 per cent. for the products of all countries which accord the United States equivalent treatment. Moreover, this tariff reduction clause in the final writing of the bill was made automatic, so that any reduction abroad wins immediate favorable treatment here without awaiting executive action.

GMC Reports Good Sales

Proof that big business interests throughout the country are now on a normal schedule again is cited by Vance Day, general sales manager of the General Motors Truck Company, of Pontiac, who asserts that for the first time in two years large fleet owners are again buying trucks on a large scale. Mr. Day believes that an almost infallible barometer of general business conditions can be found in the truck market.

Transportation, Mr. Day believes, is the one thing which indicates the growth or falling off of any business. As an instance, when the business depression of last year first came noticeable to the general public it had been noted long before in the truck industry. Similarly, business throughout the country must be on a sound basis since the truck transportation field has picked up tremendously in the last few months.

It is his contention that instead of receiving small orders for one or two trucks, as they have been doing, the five big packers, owners of some of the largest truck fleets in the world, are again in the market with the Standard Oil Company and other large fleet owners. The company has been filling single orders for 20 and 25 trucks at a time and its salesmen report that still larger orders will be forthcoming soon. Mr. Day points to broader sales opportunities in the many new enterprises which will be started during 1923, which will demand motor trucks to meet their problems.

California has 212 motor express lines, leading all other states.

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Economic Value of Highway Transport Franchises

By ARTHUR H. BLANCHARD

Professor, Highway Engineering and Highway Transport, University of Michigan

A STATE highway transport franchise constitutes an agreement between a state controlling body, as the party of the first part, and the highway transport operator, as the party of the second part, covering a guarantee of definite service on a prescribed route under stipulated conditions by the highway transport operator and a guarantee by the state that there shall not be unwarranted, ruinous competition by other highway transport operators.

Highway transport operators operating under franchises are motor vehicle common carriers, as they carry indiscriminately within reasonable limitations, all persons or commodities, under general conditions of agreement applicable to the whole public, on defined routes according to definite service schedules. For example, it is evident that the highway transport services rendered in accordance with the following definitions may be covered and controlled by highway transport franchises:

(1). Rural motor express pertains to the highway transportation of commodities on defined routes according to service schedules from several producers in a rural district to a terminal with or without return loads being carried from the terminal to the producers or other consumers.

(2). Intercity motor express pertains to the transportation of commodities on defined routes between municipalities according to service schedules with or without service being rendered at intermediate points.

On the other hand, it is believed that the following defined services can not efficiently or legally be covered by franchises:

(1). Long and short rural haulage includes all highway transport methods which utilize highways outside municipalities, except intercity haulage and highway transport operating on defined routes according to service schedules.

(2). Intercity haulage pertains to highway transportation of commodities between municipalities, except highway transport operating on defined routes according to service schedules.

The same conclusions apply to the commercial transportation of persons.

The legal right of the state to control the operations of common carriers is generally admitted except in the case of interstate common carriers. At the present time at least 22 states provide in their statutes for some degree of state control over motor vehicle common carriers.

Are highway transport franchises an economic and public necessity? To those familiar with the development of the commercial transportation of commodities and passengers by motor vehicles during the past fifteen years in the United States and the longer history of highway transport in Great Britain, the answer is unreservedly in the affirmative. Failures of highway transport enterprises are occurring every day due to a lack of knowledge of the fundamentals of the economics, science and art of highway transport. It is reported that 90 per cent. of all highway transport companies doing business with New York City as a center fail within three years after entering this field. While 50 per cent. may fail due to cut-throat competition by fly-by-night companies, it is conservatively estimated that at least 50 per cent. fail because of lack of knowledge of the A B C's of efficient highway transport business methods, cost accounting, management, and the operation and maintenance of equipment.

Those interested in the efficient development of highway transport in the United States have a big task before them in bringing to the attention of groups of business men or capitalists, operators and prospective operators of highway transport, the necessity of having connected with their operating organizations men who are thoroughly trained in the methods of highway transport, the interrelationship of highway, railway and waterway transport, highway transport legislation, the fundamentals of highway transport cost and record systems and the principles of highway transport management, together, of course, with a knowledge of the mechanism, operation and maintenance of motor trucks, tractors and trailers.

As an integral part of the essential transportation system of America, it is absolutely necessary that highway transport be placed upon a sound business basis in order that responsible operators may be protected and that this branch of common carrier service may be conducted in such a manner as will guarantee to the public constant, efficient, economical service. From the standpoint of public safety the state must insist that our motor vehicle common carriers transporting passengers provide a maximum degree of safety to the traveling public and eliminate reckless driving by inexperienced chauffeurs and the utilization of wholly inadequate motor vehicle equipment.

Based on an analysis of all state statutes covering the control of motor vehicle operation, the powers given to state public service controlling bodies may be classified as follows:

(1). Grant, refuse to grant, amend or revoke certificates of public convenience and necessity.

(2). Prescribe routes.

(3). Fix schedules.

(4). Determine the character of service and promote the comfort and safety of the traveling public.

(5). Establish fares and rates.

(6). Require reports and uniform methods of accounting.

(7). Examine accounts and records.

(8). Supervise fiscal affairs, such as incorporation, capitalization, etc.

(9). Compel additions to, extensions of, or betterments in physical equipment.

If the powers enumerated are given to a state controlling body, what should be the qualifications of the members of such a body? It is evident that a grave responsibility to the public and to highway transport business will rest upon them. They should be men possessing vision, judicial minds, and a broad knowledge of transportation, and should be unprejudiced pertaining to the relative development of railway, waterway and highway transport. Different fields of public and business affairs should be represented.

An efficient controlling body might be made up of the attorney general of the state as an ex-officio member; a highway transport man of high standing and possessing a broad knowledge of the development of all phases of transportation of commodities and passengers by motor vehicles; an experienced highway engineer, who understands the fundamentals of highway transport and who thoroughly comprehends the relationship existing between the economic operation of highway transport and such highway factors as grades, alignments, widths, drainage, foundations, the character and maintenance of roadway surfaces, and the methods of controlling and directing the operation of traffic on highways; a business man who has dealt with big commercial problems; and a banker who is familiar with the practice of bonding common carriers and other enterprises in connection with the operation of which the public must be protected. To this group of five might be added a steam railroad man and an electric railway man provided that they possess a broad vision relative to the development of transportation in America.

In conclusion, it may be said that, in the opinion of the writer, the highway transport operator of sound financial standing, who is endeavoring to render to the public an efficient, economical and safe transportation service, will welcome the passage of state laws relative to highway transport franchises provided that they are based and administered on the principles which have been herein outlined.

Comet Future in Doubt

Assets of the Comet Automobile Company of Decatur, Illinois, as given recently by John W. Evans, master in chancery, in his report to the Circuit Court, in the case of that company against the Farmers State Bank & Trust Company, amount to $461,000; and the total ascertained liabilities, other than the $250,000 of bonds held as collateral security by the bank, are considered to be less than half the value of the assets.

The future of the company is uncertain. The receivers will make no effort to operate the plant. They are now taking an inventory. The parts department is open in order that owners of Comet cars can purchase spare or extra parts if they require them. The receivers will probably also order the completion of a number of cars.

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Tire Production Falls

An increase in tire production for September over the same month a year ago is noted in the figures compiled by the Rubber Association of America. The output, however, declined from the total for the previous month of this year.

A comparative table of inventory, production and shipments of solid tires, casings and tubes follows:

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

SOLID TIRES.

1921—	Mfrs. Reporting.	Inventory.	Production.	Shipments.
Jan.	12	303,753	21,220	29,116
Feb.	12	304,374	23,365	29,599
Mar.	12	283,800	28,710	43,926
April	12	269,985	28,859	42,080
May	12	264,663	35,156	40,122
June	11	240,336	28,395	49,867
July	11	220,003	35,123	55,678
Aug.	11	216,367	55,694	66,866
Sept.	11	161,832	37,441	50,276
1922—				
Jan.	11	181,769	40,224	33,294
Feb.	11	183,448	39,492	36,805
Mar.	11	182,197	49,433	48,350
April	11	173,748	46,664	52,309
May	11	170,904	57,640	60,711
June	11	169,808	66,059	63,408
July	11	176,375	71,505	60,425
Aug.	11	189,698	84,313	69,435
Sept.	11	200,016	82,767	66,797

PNEUMATIC CASINGS.

1921—	Mfrs. Reporting.	Inventory.	Production.	Shipments.
Jan.	45	5,319,605	703,430	965,417
Feb.	45	5,193,018	819,892	1,073,756
Mar.	46	4,597,103	1,163,314	1,614,651
April	49	4,527,445	1,651,418	1,785,951
May	59	4,451,668	2,100,917	2,085,882
June	63	4,154,456	2,313,365	2,643,850
July	63	3,892,037	2,570,524	2,757,581
Aug.	66	3,934,853	3,043,187	2,894,242
Sept.	63	3,340,798	1,929,268	2,047,929
1922—				
Jan.	66	4,174,216	2,055,134	1,596,806
Feb.	66	4,691,329	2,084,308	1,562,365
Mar.	63	5,183,286	2,645,790	2,073,963
April	65	5,464,336	2,401,187	2,086,651
May	65	5,523,095	2,721,503	2,639,273
June	64	5,042,147	2,838,890	3,133,260
July	63	4,834,106	2,476,636	2,695,095
Aug.	63	4,629,392	2,905,209	3,029,823
Sept.	64	4,612,037	2,504,744	2,502,106

TUBES.

1921—	Mfrs. Reporting.	Inventory.	Production.	Shipments.
Jan.	47	5,586,163	740,824	1,042,617
Feb.	46	5,415,464	916,627	1,129,881
Mar.	48	5,044,861	1,346,483	1,643,690
April	51	4,916,772	1,762,122	1,983,571
May	57	4,751,880	2,210,040	2,342,567
June	60	3,835,098	2,359,928	3,232,673
July	61	3,122,815	3,020,981	3,603,248
Aug.	64	3,649,319	4,430,152	3,804,060
Sept.	62	3,827,830	3,274,822	2,645,758
1922—				
Jan.	66	5,246,647	2,343,393	1,889,724
Feb.	65	6,141,956	2,596,774	1,702,583
Mar.	63	6,991,118	3,017,511	2,090,737
April	65	7,230,096	2,650,573	2,329,343
May	65	7,189,552	2,970,696	2,938,947
June	64	6,186,534	3,130,629	3,973,679
July	63	5,675,839	3,068,199	3,630,744
Aug.	63	5,207,228	3,808,224	4,220,055
Sept.	64	5,164,757	3,501,442	3,558,971

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

Penetration of the Sahara Desert by motor vehicles is one of the latest adventures in transportation, as chronicled by Wilbur Forrest, in the *New York Tribune*, French explorers are planning a trip in armored cars into regions which white men have never visited. The journey will start about December 1 this year.

The Electric Railway View of Urban Transportation

By CARL D. JACKSON

Chairman, Wisconsin Board of Railroad Commissioner

THE advent of the "jitneys" and 'buses was at first hailed by the average street-car rider with considerable enthusiasm. It took time and experience to show that the car rider could not have both "jitneys" and street-cars and it was soon very evident that "jitneys" and 'buses could not render the service rendered by the street-car systems. They neither offered the magnitude of service, the certainty of service, nor the reasonableness of service offered by the street-car systems. In general they confined their efforts to taking the cream of the traffic, the short-haul passenger, with the result that the most paying part of the street-railway business was taken from the street-railways and the average cost per street-car passenger was greatly increased. Motor 'buses and "jitneys" have been demonstrated to be impossible as substitutes for the street-railways and, insofar as they acted as competitors paralleling routes, their service was uneconomical and represented and inefficient duplication of facilities. The remedy for peak-hour traffic problems would appear to be effective coöperation by all parties interested in improving the condition of that service and by effective regulation to insure the best street-car service possible without resorting to competition of independent "jitney" and motor 'bus operation, which in the long run simply serve to increase the general costs of transportation to the riding public.

That the public has come to take the correct view of the "jitney" and 'bus situation seems to be clearly demonstrated where the matter has been brought directly to a vote of the people after the effects of "jitney" and 'bus competition have been demonstrated. Wherever any large city has been forced to rely on motor 'bus or "jitney" service as its only means of transportation, a chaotic condition has resulted. The continuance of such a condition would be impossible. The "jitney" and 'bus service has never been able to provide and cannot physically provide the necessary vehicles to take care of the riding public. The fact of the matter is that the feet of space per passenger occupied by "jitney" or motor 'bus is much in excess of the feet of space per passenger occupied by the street-car, and for that reason alone the substitution of "jitneys" and motor 'buses for street-railway transportation is impossible.

Good illustration of the failure of motor 'buses to meet street-urban requirements is found in such cases as those at Bridgeport, Toledo, Des Moines and other cities where they have been given full opportunity to show what they could do. In Des Moines, service was suspended for eleven weeks, during which time motor 'buses and "jitneys" attempted to take care of the traffic. During this period a convass of 12,000 women was made by the Women's Bureau of the Chamber of Commerce. This canvass showed 99½ per cent. of women favoring electric railways as against the 'buses, 94½ per cent. voted for the 8-cent fare franchise provided fares were reduced as traffic increased. The street-cars were voted back by a vote of nearly 17,000 to 8,700. The street-railway company in Des Moines is now operated under a service-at-cost contract, and the receivership, which had been in effect for more than three years, was lifted in April, 1922.

Toledo's experience for 27 days resulted in the return of street-cars for service under new franchises amidst the general acclaim of the entire city. The experience at Bridgeport, Connecticut, where the "jitneys" and 'buses were given the opportunity of even a considerably longer trial, had the same result. Every city which has been without street-car service for any period of time has recognized that street-car service is not merely a matter of concern to the street-car companies, but is vital to the social and economic welfare of the city.

While the "jitney" and 'bus situation has cleared itself generally in the public mind, the laws in many of the states and perhaps in most of the states are yet inadequate for handling this sort of competition. In many instances—municipal action has solved the question, but the situation demands general power in regulatory bodies to prevent competition of "jitneys" and 'buses with essential street-car service. In the meantime regulatory bodies and the public realize that transportation by electric railways will always be necessary; that no substitute has been found for it and that nowhere in the United States in any city of considerable size is transportation being exclusively furnished successfully by other agencies such as "jitneys" or 'buses.

This is not saying that there may not and is not a very proper field for motor 'buses. Recent developments indicate that they may have a very proper place in the scheme of urban street-railway transportation as feeders to existing street-railway lines and as a means of serving thinly settled territory where the traffic does not warrant the extension of the street-railway system, but where the general welfare of the city requires that the residents of this section be furnished with some satisfactory means of transportation. Feeder service of this nature should be furnished by the street-railways themselves in connection with their transportation system and co-ordinated with it.

Colonel Charles Clifton, president of the National Automobile Chamber of Commerce, has been made a member of the Legion of Honor of France, in recognition of his service in connection with motor truck production and supplies. The induction ceremonies took place at the Buffalo Club, Buffalo, New York.

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Plan of Highway Teaching Mapped Out by Educators

WHOM TO TEACH, WHAT, AND HOW

The committee headed by Dean C. J. Hughes of Harvard University Engineering School has reported on the methods and nature of the instruction in highway regulation and safety. The recommendations follow:

I. Whom to teach:

(a) Those who will design, construct and maintain highways.

(b) Those who will design, construct, maintain and operate motor vehicles.

(c) Those whose business will be to make highway regulations and enforce them.

II. What to teach:

(a) Design of highway and rolling-stock from the standpoint of traffic regulation and safety.

(1) Determination of proper width, crown, kind of surface, treatment of curves, parking spaces, safety zones, crosswalks, car tracks, street intersections and other details of construction from the standpoint of traffic efficiency and safety. This is a logical part of the regular instruction in highway engineering.

(2) Design and construction of motor vehicles from the standpoint of safety; brakes, gears, headlights, signaling devices on cars, steering apparatus, tires, non-skid devices and various types of guards.

(b) Design of signs, signal and illuminating apparatus and devices.

(1) Traffic guides for pedestrians and drivers, lines in or on pavements, signs, stanchions, traffic-mushrooms, dummy-cops, semaphores, crowsnests and such other devices as may be developed for the guidance of traffic.

(2) Lights for vehicles, lights for traffic guidance and general illumination. Color, shape and movement of signs and lights, and light intensities. Ways and means by which best types can be determined and standardized.

(c) Regulation of traffic for efficiency and safety. Compilation and comparison of existing regulations and detemination of underlying principles with the ultimate object of determining a unified code which will be generally applicable and acceptable.

(d) Traffic administration.

(1) Registration and licensing of vehicles and drivers.

(2) Testing and examination for qualification of drivers.

(3) Education of drivers.

(4) Education of general public in traffic regulations and safety.

(5) Finance.

III. How to teach it:

(a) Regular instruction (course work) —When the fundamental principles have been determined and codified they should be made a part of the regular instruction for all engineers who are likely to deal with any kind of highway transportation problems; but before this is done it will be necessary to make a comprehensive study of these problems. Since subjects to be taught include so many fields of knowledge the instruction must involve many departments of the university, such as psychology and economics, as well as engineering. Instructors from these departments should be brought in and their instruction made an integral part of the course work.

(b) Resarch (the investigation of all phases of design and traffic problems, collection and comparison of data and codification of underlying principles)—There are various methods and agencies which may be utilized:

(1) The National Research Council, acting as a correlating agency for various aspects of the same problems to be worked out in properly equipped universities.

(2) Organizations such as the Eno Foundation for Highway Traffic Regulation, which has already done considerable effective work in this field.

(3) Organizations for the study and promotion of traffic safety.

(4) Automobile and other commercial and industrial associations.

(5) Federal, state and local governmental agencies.

(c) Practical training—Properly organized summer training for under-graduates and graduates by the industries and by federal, state and local agencies concerned with highway transportation. It is beginning to be recognized that the schools can not teach practice.

(d) Educating the practitioner—Engineering and motor magazines, as well as general publications, should be more systematically and effectively utilized in disseminating principles and changes in practice.

IV. Recommendations for gathering materials and determining principles:

The committee believes that a study of the underlying principles of the best practice in relation to traffic regulation and safety is of fundamental importance. The committee, therefore, recommends that the Highway Education Board ask the Eno Foundation for Highway Traffic Regulations, Inc., to take up these problems as a continuation of the work of the Council of National Defense for the investigation, codification, publication and standardization of general highway traffic regulations; thus insuring continuity and permanency in the study of these important problems.

London 'Bus Fares Reduced

A series of reductions in fares just announced on all services operated by the underground and allied enterprises in London —including the London Gereral Omnibus Company—will have the effect of abolishing the 3-cent omnibus fare, making the charge 2 cents for the same distance. Other fares will be correspondingly readjusted. The maximum fare over all services will be 2 cents per mile. As these changes necessitate the revision, on the omnibus routes alone, of 12,000 separate fares, and the printing of 100,000,000 new tickets, they can not be brought into force until January 1 next.

Electric Railway Research at Standstill, Says Budd

PUBLIC WANTS SPEED AND COMFORT

Britton I. Budd, president of the Chicago Elevated Railways and of the Chicago, North Shore & Milwaukee Railroad, in discussing the question of the electric railways' relations with the public, says that the public's concept of transportation service has undergone a radical change in recent years and that the development of the gasoline engine has been the most important factor in bringing this about.

"The traveling public has become accustomed to the speed and comfort of the automobile," he said. "The standard of transportation service has been raised to a higher level. We, who are engaged in furnishing transportation service, must recognize that higher standard and band our energies toward approximating or excelling the new standard of speed and comfort. It is futile for us to bewail the advent of the automobile which has spoiled the tastes and habits of our customers. That is water that has gone over the dam. Our business is to supply a service that will save time, save money and equal the comfort and convenience of the automobile. We cannot do that, however, by following the methods of a few years ago.

"In that connection I would say, incidentally, that the manufacturers in our industry can be of great assistance. In the automobile industry the manufacturers are constantly striving to attain greater heights of economy and durability, beauty of design and comfort. No such efforts are being put forth in the electric railway industry. The same type of car seats in which our fathers sat are still being manufactured, the electrical equipment is much the same as it has been, research is at a standstill; in short, our manufacturers seem to be working on the theory that their job is finished and there is nothing new under the sun. There is plenty of inventive genius among the manufacturers of electric railway equipment, but it does not appear to be applied in the direction of producing something that is an improvement from the standpoint of efficiency, economy and comfort."

Locomobile Property Transferred

By order of Referee Keogh the property of the Locomobile Company of America at Bridgeport, Connecticut, has been formally transferred by the trustees to the new Locomobile Company of America, a New York corporation, which is controlled by W. C. Durant. The new interests are proceeding along the policy decided upon when Durant first took over Locomobile.

The schedule calls for the manufacture of 800 machines during the 1923 season, and 1,000 men will be employed at the Bridgeport plant. No new models will be added nor will there be any price changes. The sales organization will be strengthened in all parts of the country, and new district representatives added in those sections where the conditions demand them.

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Coördinating Trucks and Railways

By W. H. LYFORD

Vice-President, Chicago & Eastern Illinois Railway, Chicago

THE transportation of goods is an absolutely essential requirement for the family, industrial and commercial life of a civilized people. The furnishing of transportation is sometimes considered a function of the government, but the people of the United States will not permit the government to perform transportation, except through the mail service and for packages weighing 70 pounds or less. All other transportation of goods must be performed by the person requiring it, or by a carrier for hire. This discussion will be confined to highway and railway transportation of goods for hire.

Transportation is not complete until the goods are moved all the way from the premises of the shipper to the premises of the consignee, and, for brevity, we will call such movement "complete transportation." Also for brevity, we will use the British term "trader," which includes both shipper and consignee, or all persons for whom transportation of goods is furnished for hire.

The trader is concerned only with complete transportation. His greatest need is that complete transportation shall be furnished with regularity and within reasonable time. His secondary need is that the charges which he must pay for complete transportation shall not be more than the traffic will bear, without curtailing his profitable trade.

Complete transportation can not be furnished regularly and promptly unless the charges of the carrier are high enough to pay all the expenses of carriage and a profit sufficient to warrant the investment of capital and energy in the installation of the transportation service and in increasing the service as traffic increases. In normal times, the volume of freight traffic in this country increases at a rate of not less than 6 per cent. per year.

The trader is entitled to the best transportation service which can be furnished for the charges which he pays and it is the duty of carriers who, singly or jointly, undertake to furnish complete transportation, to make their charges as low as is consistent with the maintenance of adequate, regular and prompt service.

We are accustomed to think of the transportation of goods as divided into four general classes: (1) parcel post, (2) express, (3) less-than-carload or package freight (commonly called l. c. l.), and (4) car-load freight.

The essential difference between car-load and l. c. l. freight is that car-load freight is loaded and unloaded on an industry track or a team-track by the trader, or by someone employed by him, while l. c. l. freight is loaded and unloaded and passed through a station, at the expense of the railway. Consequently, car-load rates are substantially less per ton than l. c. l. rates, for carrying the same goods.

Whether the government, the express company or the railroad company undertakes to transport the goods, the railway actually performs the entire transportation service, except the movement between the premises of the traders and the stations of the railway companies. Such movement is called "collection and delivery." Parcel post is not collected, but it is delivered by the government. Express is collected and delivered by the express company. Freight is collected and delivered, not by the railway company, but by the trader or by the owner of trucks or teams, whom we will call the "trucker."

Because the railway does not furnish collection and delivery and that service must be performed by or at the expense of the trader, the traders have located their industries as close as possible to railway stations. Consequently, the vicinity of the freight-station is usually a congested district in any large city. If the railway furnished collection and delivery, the location of the freight-stations would be immaterial to the trader. A distance of 2 miles between the locations of two stations in a large city may make a difference of 300 per cent. in the interest charges on the real estate occupied by the stations. In Chicago the interest charge alone on real estate at Roosevelt Road, on which a freight-station is located, is more than $2.50 per ton of freight handled through the station. If the station were located at 33rd street, such interest charge would be reduced to about 80 cents per ton. The amount of interest saved by moving the station to 33rd street would pay the cost of well organized cartage between the 33rd street station and the premises of the trader. The present cartage charges would be saved.

Outbound freight is moved to the station in whatever way and at whatever time the trader chooses during the business day. Inbound freight is removed from the railway-station in whatever way the trader chooses and, on the average, about 3 days after the freight arrives. Therefore, the station becomes a storage warehouse, congested with piled-up freight awaiting delivery to the trader at his convenience. With collection and delivery service controlled by or in full coöperation with the railway, large freight-stations with storage facilities would be unnecessary. A narrow platform, with a roof over it and with tracks on one side and a highway on the other, is all that would be required.

With very few exceptions, railway freight-stations in large cities already are so congested that, unless we can find some way to pass more traffic through the existing facilities, or to keep on enlarging and multiplying them, by extravagant expenditures for additional real estate and track connections, the railways will not be able to handle the normal increase in freight traffic.

Railway companies are organized to furnish transportation. Storage is a separate field for enterprise. The public warehouse is needed and should be fostered because it can be operated at a profit. Storage in railway-stations rarely is profitable to the railway company and it seriously interferes with the legitimate function of the railway, transportation.

The fields within which complete transportation of goods can be furnished by highway alone or by railway alone are limited. There are very few industries or residences in the continental United States which are not connected with each other by highway, and it is physically possible to perform complete transportation of goods by highway between almost any two industries or residences. But such transportation is most economical only when limited to the movement of goods between homes or industries which are within reasonable trucking distance from each other. The determination of such reasonable distance depends on many conditions and a competent truck expert will place it anywhere between 25 and 150 miles. Of course, there are emergencies and peculiar industrial conditions which, in rare cases, make trucking economical over a distance of several hundred miles, but such cases are negligible in the consideration of the whole field of highway transportation.

On the other hand, comparatively few industries and practically no residences are connected with each other by railway. Therefore the field for complete transportation of goods by railway is restricted to the movement of car-load freight between these industries which have direct rail connections. In that limited field the railway is the most economical means of transportation. A fair example is the movement of coal from mine to an industry located on a side track.

IN THIS country four different agencies are competing with each other for the transportation of the same goods: (1) Parcel post, (2) the express company, (3) the railway and (4) the trucker. While the parcel post and express are transported over railways, the government and the express company compete with each other and with the railway for the carriage of packages weighing 70 pounds or less, and the trucker competes with the three other agencies.

Competition for the local carriage of goods within city and suburban areas ought to be welcomed by the railways, as they perform this service at an actual loss, while the trucker can perform it at a profit. On the other hand, competition with the railway for the carriage of goods through rural districts, along main lines of railway, is harmful to the railway and unprofitable to the trucker.

For parcel post there is complete coöperation between railway and highway transportation, as the government has its own

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cartage system. There is like coöperation in the express business, as the express company operates its own trucks and wagons. For freight traffic, there is hardly any coöperation between the railway and the motor truck.

I have marshalled the foregoing facts, without any idea that they would be new, but that they might form a background for the statement that unless there is a radical change from present practices in railway transportation in the United States our great transportation system, which is the wonder of the world, will become a hindrance to the further progressive development of this country.

FIVE years ago, when our railway system was placed under federal control, its march of progress was halted and it has never regained its stride. Its development has not kept pace with the industrial development of the country, because its revenues have not been sufficient to attract the additional capital necessary to finance the cost of normal additions and betterments to road and equipment.

The public is clamoring for lower rates, while existing rates are not high enough to produce the net railway operating income which, as determined by the Interstate Commerce Commission, the railways are entitled to earn. Still the tendency of the commission is to reduce rates and there is no reasonable hope of increasing them.

Disregarding the temporarily bad condition of railway equipment resulting from the existing strike of the shop crafts, the only limitation on the volume of traffic which the railroads can move is due to the railway terminal facilities which are inadequate to take care of the traffic which easily could be transported over the main lines of railway.

Under existing rates, the line haul of freight would be highly profitable, if the revenue therefrom were not absorbed by constantly increasing terminal expenses. If the railways are to remain solvent and carry the traffic for which rail transportation is demanded, they must find a way, first, to reduce terminal expenses, and second, either to enlarge their terminal facilities or to pass more traffic through the existing facilities. Now to do these things is, in my opinion, the most important problem before the American people. I have devoted to it all the time I could spare from my regular duties during the past 15 years, and have arrived at the definite conclusion that the problem can be solved only by remedying the following evils:

(1). Too low compensation paid to the railways for carrying parcel post and express on passenger trains.

(2). Lack of organized collection and delivery service, which lack makes it necessary to furnish unreasonably large and expensive freight terminal facilities, and an unreasonably large supply of freight-cars.

(3). The use of box-cars for the transfer of l. c. l. freight between railway stations in large terminal areas. The trucker could perform that necessary service more quickly and economically. Thousands of box-cars thereby would be released from an unprofitable service and would substantially increase the carrying capacity of the railway.

(4). The use of box-cars as trap-cars, for moving l. c. l. freight through terminal areas for industries which have rail connections, and the iniquitious absorption by the railways of trap-car, subway, and lighterage expenses, which is equivalent to furnishing free cartage to the favored few large traders, in discrimination against the average trader, who is obliged to provide or pay for his own cartage.

(5). The operation of branch lines on which the traffic is too light to sustain railway transportation and which could be served better and at far less expense by the motor truck.

The most important field for coöperation between the railway and the truck is offered by collection and delivery of l. c. l. freight in large cities. Comparatively few trucks are used in this service, first, because there is no coöperation between the trucks themselves, and second, because there is no coöperation between the trucker and the railway. As the collection and delivery of l. c. l. freight in large cities is now conducted, the delays to trucks in reaching the station door and in loading and unloading the truck, make unprofitable the use of the truck in station service, so that by far the greater part of this service is performed by horse-drawn vehicles. Truck transportation is only profitable when the truck can be kept moving the greater part of the time.

Notable experiments have been tried in the United States for handling the collection and delivery of the freight of one railway company in a large city, and, so far as I have been able to learn, none of them have been successful. No single railway company receives and delivers freight from and to every part of a large city in sufficient volume to make profitable the collection and delivery of such freight by a trucking organization. I am satisfied, however, that the combined l. c. l. freight of all the railways reaching a city could be collected and delivered by a properly equipped single trucking organization, working in full coöperation with the railways, at less cost than is now paid by the traders in that city for cartage, and still yield a reasonable profit to the trucking organization.

For many years the Canadian railways have furnished collection and delivery in the principal cities of Canada under separate cartage tariffs. The president of one of the largest Canadian railways is my authority for the statement that his railway could not possibly handle its traffic through its present terminal facilities without well organized collection and delivery service.

In England, Scotland and Wales, the railways are furnishing collection and delivery at practically all of their stations. . . . The several general managers with whom I discussed these problems in Great Britain were unanimous in expressing the following conclusions:

(1). That the collection and delivery of freight, at terminal cites and in large industrial centers, by a single trucking organization is absolutely essential to the most efficient operation of freight-stations and that with such a trucking organization coöperating with it the railway company may control the time of collection and delivery of freight and is able to operate its stations throughout the 24-hour day if necessary, and to use the same platforms and forces for handling inbound and outbound freight.

(2). That collection and delivery can be furnished under a separate tariff at rates high enough to produce an actual profit from the cartage operations, after paying all expenses, and low enough to induce 95 per cent. of the traders to avail themselves of the organized collection and delivery service rather than to perform it themselves.

(3). That in England, where the general conditions are substantially like those in New England, the railways and the traders have prospered under unified cartage systems without any substantial additions to station facilities.

In all these conclusions of the British railway managers I heartily concur and I believe they ought to be adopted by American railways. Contrast the operations of a large terminal freight-station in the United States with a typical British "goods" station.

In this country the inbound freight is handled over one set of platforms by one working force and the outbound freight is handled over another set of platforms by another working force. Each set of platforms and each working force is operated through the entire business day, as freight is taken away from the inbound station and received at the outbound station during the entire day. The inbound platform is piled up with freight awaiting delivery, interfering with the movement of freight across the platform. When the inbound cars are unloaded, they must be pulled out of the station and set into the outbound station for loading the following day.

IN A typical British station the same platforms are used to handle not only the inbound and outbound traffic, but also a third class of traffic and they are operated through the entire 24-hour day. When the day force goes on duty at 8 A. M., a line of cars loaded with inbound freight is standing on one side of the station platform and a continuous line of horse trucks is backed up to the other side of the platform. The city is divided into districts and the freight for one district is loaded into one or more trucks, there being more trucks at the platform than there are districts in the city. As soon as a truck is fully loaded, a driver is summoned by telephone from a nearby stable. He comes with a heavy Clydesdale horse and drives away with a 3-ton load to the proper district, where he makes delivery. When one truck is loaded and driven away, another empty truck is backed into its place, loaded and driven away. Before noon all the inbound freight has been removed from the cars and delivered by trucks. At 1 P. M. the station platform is clear and ready to receive the outbound freight which is collected and delivered at the station by the same drivers who delivered the inbound freight in the forenoon. All the outbound freight is collected before 5 P. M., loaded into cars and despatched before midnight. The platform is again clear and ready to receive the heavy fish and vegetable traffic which begins to arrive at 1 A. M. and is delivered at the markets be-

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fore 6 A. M. At 8 A. M., the platform is again clear and the empty trucks are standing at the platform ready for the inbound merchandise.

For the collection and delivery in this country demountable truck bodies, trailers, or semi-trailers doubltless would be used instead of the British trucks, and gasolene or electric tractors would be substituted for Clydesdale horses. On our station platforms we doubtless would use 4-wheel trailer trucks drawn by electric tractors instead of the old-fashioned 2-wheel trucks which are used in Great Britain. In fact, I left that country with the firm conviction that with our American methods applied to the British system of collection and delivery much greater efficiency would be obtained and better service would be rendred than is now rendered in Grat Britain. . . . .

There is a second field for coöperation between the motor truck and the railway, which would require a more radical departure from present methods than the one just mentioned, but which would produce even more beneficial results to all parties concerned. It is the organized delivery of coar-load freight from public team trucks in large terminal areas.

As already stated, this freight is now loaded, unloaded, collected and delivered by the trader, or at his expense. In different cites the trader is allowed from 2 to 5 days within which to unload cars after he has received notice that they are ready to be unloaded.

Generally speaking there is a shortage of team tracks in the central districts of large cities and it is next to impossible for the railroads to furnish additional team tracks. Cars must be held in the outer yards until there is room for them on the team tracks, and then they must be held on the team tracks until it is convenient for the trader or his trucker to unload them. The necessary districts are full of idle cars, and I think it is safe to say that the average time that box-cars are delayed at the port of New York and in the switching district of Chicago is 10 days per trip. If all the freight-cars which carry loads into the port of New York, the switching district of Chicago, and other large terminal areas, could be unloaded on the day of their arrival, they could be loaded out on the same day, or the following day, and the present freight-car equipment of the railways would be sufficient to meet all transportation needs for several years to come. . . .

ANOTHER field for the profitable use of the motor truck is the transportation of freight between communities which are served by branch lines of railway, on which the traffic is too light to pay the expenses of any kind of railway transportation. Such branches are almost innumerable and are scattered over every part of the country. They were built before motor transportation was perfected and, undoubtedly, they have performed a necessary public service, but they have outlived their usefulness. The transportation furnished over such lines could be performed better and more cheaply by motor conveyances over the public highways. No more such branch lines ought to be or will be constructed, if the trucker will take over the field and occupy it intelligently and efficiently. In recent years I have known of several cases where railways seriously have contemplated the construction of branch lines, to reach small cities and towns, and, on investigation, have found that they could better afford to establish their own truck service, and the proposed branches have not been built.

Five parties are interested in bringing about the changes we have outlined:

(1). The whole public would be benefited in that the city streets would be relieved from the congestion caused by wagons and trucks carrying small lots of freight to and from the railway-stations. The new rural highways would last longer, as the coöperation of railway and truck would put an end to long-distance trucking.

(2). The trader would get better service at less cost.

(3). The motor-truck industry and existing cartage companies and private truckers who would coöperate with the railways would vastly increase their field for profitable operation.

(4). The warehousemen would profit by the additional storage now furnished by the railways.

(5). The railways would cut down their terminal expenses and would increase their capacity for service.

The trucker has a distinct advantage over the railway in that highways are constructer by the general public, through some form of taxation, while the railway is constructed at the private expense of the railroad company. The railway, through taxation, pays a large share of the cost of constructing and maintaining highways, while the trucker pays no part of the cost of constructing or maintaining the railway. If the trucker is to compete with the railway, either he should pay a substantial part of the cost of constructing and maintaining the highways or the railways should be relieved of taxation for highway purposes.

If, however, the trucker, first, would perform that part of transportation furnished by the dailway at an operating loss and on which the trucker could make a reasonable profit; second, would cease to compete with the railway for the traffic which the railway can carry at a profit and on which the profit of the trucker is very doubtful; and third, would coöperate with the railway in handling traffic which requires transportation both by rail and highway; in other words, if the truck would supplement the railway service instead of competing with it, then it would be to the interest of the railway that the expenses of the trucker should be reduced to the lowest possible limit, and, in my judgmnt, the railway could well afford to pay substantial taxes for highway purposes and to make no objection to the free use of the highway by the trucker.

There is a steady and, for the trucker, an alarming growth of public sentiment in favor of imposing upon the trucker a more substantial part of the cost of maintaining and renewing public highways, which, it is claimed, are destroyed by heavy trucks almost as fast as the highways can be constructed. If the public were satisfied that the truck was only used as a common carrier where the railway could not furnish as good and as cheap a service as the trucker furnishes, I believe the public would cease demanding that greater burdens be placed upon the trucker, which would increase the cost of his service.

No single scheme of operation will fit all terminal situations. The situation at the port of New York seems to me to demand the use of motor trucks with demountable bodies or trailers to move the freight by way of ferries and city streets between railway terminals on the New Jersey shore and inland off-track stations in the different industrial centers of New York. The movement across the rivers is now made principally in freight-cars on car-floats. By the use of ferry boats and inland off-track stations, the railroads would be able to release large holdings of very valuable dock property on both sides of the rivers and such property would become available for the docking of ocean steamships for which there is great demand.

THE inland stations could be constructed on much less valuable property, and if used as universal stations for all railways and steamship companies, they would offer superior advantages for upper floors which could be devoted to warehousing or other industrial purposes. I have been assured by New York real estate men of great experience that they would undertake to secure sites for such inland stations in all parts of New York and the construction thereon of buildings in whcih the first floors would be adapted for use as railway-stations. They were willing to guarantee that the station floors would be leased permanently to the railway companies at nominal rentals on condition that the occupants of the upper flóors might have access by elevators to the station floor for the receipt and delivery of freight, without any expense for cartage.

All the traffic now passes through the streets of New York. An organized truck service would substantially reduce the number of vehicles on the streets and the cost of the service would be much less than the expense of the present car-float operations.

The situation at Chicago is more complex. The distances are so great and the railway systems so completely cover the city that I think the railways must supplement the truck service for movements over long distances.

In Cincinnati an organized truck service is in operation and conducts most of the transferring of freight between the city stations of all the railroads centering there. All stations are equipped with the necessary machinery for handling loaded and empty 5-ton demountable truck bodies, which are loaded and unloaded on the station platform and promptly moved by trucks, under the control of a truck despatcher. This station-to-station service could easily be extended to the various industries. In fact, some of the largest traders in Cincinnati already have requested such extension service.

At St. Louis organized motor truck service with trailers and semi-trailers has long been in operation between the freight-stations at East St. Louis and inland stations in St. Louis. The service conforms closely to that outlined for the port of New York,

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Travels 26,460 Miles in Two Years at 34 Cents a Ton-Mile

By WILLIAM GREEN

William Green & Company, Philaldephia

WE ARE in the general hauling and moving business, and do both local and long-distance work. Our equipment consists of a 1½-ton Selden truck and two others. During the last two years the 1½-tonner has operated an average of 45 miles a day and has lost only 4 weeks' time.

This truck does hauling work all over Philadelphia and vicinity, taking in such points as Camden, New Jersey, Kensington, Germantown, Manayunk, and others. It also makes long-distance trips to Atlantic City, Cleveland, New York City, Wilmington, Baltimore, Pittsburgh, Akron, Chester, and Springfield, Massachusetts. Some of our business comes to us because we have been operating for several years and are pretty well known. But in lean times we sometimes have to go out and get business.

The loads consist of almost anything, but are largely yarn and cotton in bales and cases, which we haul between the railroads and wharves for the cotton and yarn mills around Philadelphia. The truck also handles a lot of furniture, particularly during the spring, as well as machinery of all kinds. For one of our big customers we do a good deal of hauling between two plants.

When we are hauling bales of cotton we sometimes put on as many as 12 to a load. Since each bale weighs 400 pounds, this is a load of 2.4 tons. This is the exception rather than the rule, however, because we try not to put more than 1½ ton on the truck.

The 1½-tonner averages 9 miles to a gallon of gasolene and 360 miles to a gallon of oil. We figure its life at 5 years or 65,000 miles. Repairs and maintenance so far have cost only $250, or less than 1 cent a mile, but we are allowing $300 a year to cover this item. If we were not making so many long-distance hauls, the repairs would be considerably less, but these long trips are very hard on a truck.

The number of trips made per day depends entirely upon the nature of the hauling, but a fair average is 7. The average number of stops is 30 per day. The truck has a very good driver who works on a straight salary basis. This means that we have to pay him when the truck is idle; but we find this a good investment, because he takes an interest in his work, keeps the truck in good condition, and drives it carefully.

This 1½-ton truck costs $11.46 a day, 25 cents per mile, $1.09 per ton, and 34 cents per ton-mile. These costs are unusually low for our kind of work.

In a four week period during July and August, 1920, this truck made 2 trips to Cleveland, 3 trips to Baltimore and, in addition, worked 6 days in Philadelphia. The round-trip distance to Cleveland, as we make it, is 1,100 miles, to Baltimore it is about a 200-mile round trip. On the Cleveland trips we hauled out $20,000 worth of yarn, and brought back an equal amount of wound yarn. The truck carried 2 tons each way. One of the customers of a Philadelphia concern was in a great hurry to get this yarn, and freight was too slow, so we were hired to do the job. It took us only 5½ days, in spite of the fact that we went a roundabout way through Hagerstown, Maryland, and Akron, Ohio, returning by the way of Salem, Ohio, and Pittsburgh.

The truck carried one extra driver. We paid no overtime, because the men work on straight salary; but we allowed $6 a day for meals for the two men. No hotel expenses were allowed because the men slept on the truck. The cost of this trip was:

Variable expense (1,100 miles @ 10.2 cents)	$112.20
Fixed expense (6 days @ $1.56)	9.36
2 Drivers' wages and expenses	90.00
Total cost of trip	**$211.56**

As we hauled a 2-ton load both ways, the cost was $52.89 per ton, and 9.6 cents per ton-mile.

The trip to Springfield, Massachusetts, was made during the winter. At New Haven, Connecticutt, we encountered a 6-inch snow and had to plow through it all the rest of the way. We hauled 2 tons of machinery to Springfield, and came back empty. The cost was:

Variable expense (520 miles @ 10.2 cents)	$53.04
Fixed expense (3 days @ $1.56)	4.68
2 Drivers' wages and expenses	41.86
Total cost of trip	**$99.58**

The hauling cost was $49.79 per ton and 19 cents per ton-mile. On this trip we left at 6 o'clock Saturday morning and got back at 7 o'clock Monday morning, which is about a record for this length of haul. We had no trouble in spite of adverse conditions.

Trips to New York and Baltimore are frequent. We make the 200 miles on 15 gallons of gasolene, and complete the round trip in 14 hours. We usually haul machinery or furniture, and the loads average about 1½ ton. Sometimes we get a return load, and sometimes we do not. Of these long hauls we generally get $1.00 per loaded mile. The trip to Cleveland brought us $500, so the profit was $288.44. The trip to Springfield brought in $250, making the profit $150.42.

On the regular run of work our income depends on general business conditions. At present the truck is bringing in only about $75.00 a week or $3,900 a year. This makes the annual profit $532.14 in addition to interest on the investment at 7 per cent. Normally the income is $100 a week, making the annual profit $1,832.14, in addition to 7 per cent. on the investment. At this latter rate the entire cost of the truck is repaid in a year and a half.

We have never used horses because they could not do our work, and the long profitable hauls which the trucks make would be impossible with horses. We used to use 1-ton trucks, but they were too light and did not stand up.

Operating Records.

Total Period.

Period covered	2 years
Days operated	588
Total round trips	4,116
Deliveries—pickups	17,640
Total loads—tons	6,174
Miles traveled	26,460
Gasolene—gallons used	2,940
Cylinder oil—gallons used	73½

Daily Averages.

Round trips	7
Deliveries—pickups	30
Total loads—tons	10.5
Miles traveled	45
Miles per round trip	6.4
Load per trip—tons	1.5
Ton-miles	33.6
Miles per gallon gasolene	9
Miles per gallon oil	360

COST RECORDS.

Investments.

Chassis—etc., complete	$2,700.00
Tire value	189.20
Total, less tires, to be depreciated	$2,510.80

Fixed Charges—Yearly.

Interest on total investment (5 years at 7%)	$ 113.40
Taxes and licenses	25.00
Insurance	200.00
Garage expenses	120.00
Total per annum	$ 458.40
Total per month (per day $1.56)	38.20
Total for period—2 years	916.80

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except that the trucks cross the river on high bridges instead of ferry boats.

At St. Paul and Minneapolis, the Great Northern and Northern Pacific railway companies for many years have used large box-cars as freight stations for outbound l. c. freight in different parts of both cities. When the cars are loaded, they are switched to a common transfer station, about half way between the Twin Cities, and there the freight is transferred from the station cars to line cars for any destination on either railroad.

The Chicago, Milwaukee & St. Paul Railway Company is using a similar service at the Twin Cities. The president of the latter company several years ago assured me that, by substituting that service for the separate stations previously used in each city, his company had been able to move its increasing freight traffic with 40 per cent. fewer cars than previously were required for movement from separate stations in each city.

I believe that for every city there is a practical solution which, with the full coöperation of railways and trucks, would result in the movement of freight through the city stations as soon as it arrives there and would thus enable the railway to furnish much more transportation service without increasing its facilities and without increasing its charges for transportation.

The truck should supplement the railway and not compete with it. Wherever complete transportation can be furnished by the truck more efficiency and cheaply than by the railway, the truck should be used. Wherever the railway service is adequate and profitable and less expensive than truck service, the railway should perform the service. Where the best and cheapest service can be furnished profitably by the railroad and truck combined, the railway and trucker should coöperate in furnishing that service.

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Variable Charges—Period.	
Fuel at 22 cents a gallon	$ 646.80
Cylinder oil at 60 cents a gallon	44.10
Tires—26,460 miles ($189.20 ÷ 13,000 mile life)	386.32
Depreciation—26,460 miles ($2,510.80 ÷ 65,000-mile life)	1,021.36
Maintenance and repairs (estimated)	600.00
Total variable charges (per day $4.59)	$2,698.58
Driver's wages—(per day $5.31)	3,120.00
Total fixed charges	916.80
Total operating costs	$6,735.38

Unit Costs.	
Cost per day operated	$ 11.46
Cost per mile traveled	.25
Cost per ton hauled	1.09
Cost per ton-mile	.34
Repair cost per mile—estimated	.023
Repair cost per mile—actual	.005

Federal Sees Big 'Bus Field

To meet the growing demand for motor 'buses the Federal Motor Truck Company of Detroit is experimenting with three new types, mounted on various chassis. These 'buses are being designed to meet the need for school children's transportation, city and interurban travel.

F. L. Pierce, general sales manager, asserts that the State of California leads the country in the number of 'buses now in operation. In Los Angeles alone, he says, a station has been established where more than 500 'buses leave from every 24 hours. New York State is second in the list, he says, with more than 300 regularly organized 'bus companies, serving more than 400 cities, with a capitalization of $6,000,000. In New York City alone the Fifth Avenue Coach Company carried more than 51,000,000 passengers last year.

It is the contention of the Federal executives that there are three fields for the motor 'bus: First, the transportation of school children from their homes to the schools, especially in the rural sections of the country; secondly, city transportation where thousands of workers can be carried to and from their work; and, thirdly, intercity transportation. Under this classification the company sees an immense future for the 'bus business as there are many communities throughout the country which to-day are not served with any mode of conveyance beyond the automobile or the horse.

Probably the greatest 'bus business in 1923, they feel, will develop in the school field. There is being spent annually for school transportation more than $14,000,000, nearly all of which is available as a gigantic prospect for the sale of the motor truck. Iowa, Ohio and Indiana each, he says, spends close to $2,000,000 for this service and nearly every middle western state spends close to a million dollars annually.

Mr. Pierce also points out that there are 185,000 1-room schools in the country, of which, he believes, more than 150,000 are rural schools and this means a market for at least that number of school 'buses. As an evidence of the task which confronts the school boards in all sections to transport these children it is claimed that close to 400,000 children are transported at the expense of the city or town.

The automotive industry is the fourth largest customer of the railroads, shipping 359,000 car-loads of freight during the past year.

Taxes Based on Receipts Threaten 'Buses and Trucks

By W. V. HILL

Manager, California Electric Railway Association

BY AN amendment to the Constitution, ratified by the people in 1910, the properties of public utilities, including steam railroads, are exempted from local taxation in California. In lieu thereof, these corporations are required to pay to the state a percentage of gross receipts from operation. The amount varies and has been subject to change from time to time by the legislature. The rate established for steam and electric railroads in 1911 was 4 per cent. It was subsequently increased, and the last legislature placed the rates at 5¼ for electric railways, or rather retained this rate and increased the steam railroads to 7 per cent. Other classes of public utilities were increased correspondingly. The steam railroads are contesting this increase in the courts.

It is claimed by the proponents of this method of taxation that the percentages of gross receipts of the various classes taxed is the equivalent of the taxes paid by other classes, namely, the farmer, merchant, and in fact all other class of taxable property.

Under this arrangement, public utilities are supposed to support the state government together with revenues derived from banks, inheritance taxes, licenses, fees, insurance companies and franchises. All other property is exempt from state taxation and is supposed to be levied in support of local governments, cities, counties, etc.

Motor 'buses and trucks, operating over definite routes and between definite termini, were declared common carriers and placed under the jurisdiction of the State Railroad Commission by an act of the legislature in 1917. The law does not deal with the question of taxation, however, and it is on this point that I direct attention.

It is the contention of all students of taxation, including the State Board of Equalization, that motor 'buses and trucks operating as common carriers should assume their share of the tax burden. It is well known that the state has lost several millions of dollars by not passing legislation to include this class of carrier as a taxpayer.

The 'bus and truck operators have avoided the payment of a just or equivalent tax through the employment of influential political leaders, and maintaining large lobbies during the legislative sessions. They make the contention that as our law provides that the percentages of the gross receipts paid to the state by the rail carriers is in lieu of all other taxes on property used in their business, and as this percentage is the equivalent of the tax paid on other property that they (the 'bus and truck owners) owning only their equipment, the percentage should not exceed 1 per cent. of their gross receipts. They overlook, of course, the facts that the franchises of the rail carriers enter into the valuation of the properties; that if they were required to build and maintain the highways they use, their valuation would be greatly increased, and if a value were given the franchise rights they have acquired on the highways without the expenditure of a cent, that the valuation purposes would greatly exceed per mile the franchises of the rail carriers.

It is contended now that, as the motor 'bus and truck have become established as a definite class of common carrier in California, they should assume their just share of taxation. The demand for a speedy adjustment of this inequality is growing fast. The highway commission, State Board of Equalization, Association of County Boards of Supervisors, and many other organizations have passed resolutions urging that action be taken at the next session of the legislature.

A gross receipt tax of 7 per cent. is favored, with an additional tax to be levied for the use of the highways, to be placed in the maintenance fund. This latter tax would probably be levied on the tonnage basis for trucks and a car mile basis for 'buses.

There will in all probability be increases in the general motor vehicle license tax and a gasolene tax levied at the next session of the legislature, for the highway commission is in need of funds to keep up the maintenance of the vast network of highways now being used so extensively by the large 'buses and overloaded trucks and trailers.

The last legislature passed a constitutional amendment, among other things placing a tax of 2 per cent. on 'buses and trucks. There are several other provisions in the amendment relating to taxation that are objectional and it is doubtful if the amendment will be ratified. If it should carry, then it will be necessary to increase this percentage and it requires a two-thirds majority vote of the legislature to do it, and it is going to be most difficult. Senator King, the author of the famous "King Tax Bill" at the last session which created much interest, in recommending the adoption of the Amendment, says: "One new principle—an important one—is set up. It is that motor 'buses and trucks shall pay taxes for state support. The rate of this new tax is 2 per cent. on their gross receipts. Probably this is not enough, in view of the use by them of state-constructed highways, and with the idea of placing them on a parity with other taxpayers. But it establishes the principle and the next legislature which revises tax rates can with greater knowledge determine an adequate rate."

In any event the question will more than likely be solved by the next legislature, which convenes in January. The 'bus and truck more efficiently and cheaply than by truck interests, assisted financially by the manufacturers, are very active and there

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A Fully Motorized Road-Building Outfit

By T. B. LANCASTER

MOUNTED on wheels, from mixer to cook shack, one Iowa concrete road-builder's outfit is ready at a word to pull up stakes from the job at hand and move at railroad speed to a new location.

Fully motorized and fully equipped with wheels the whole camp can be en route in case of necessity or expediency in a few moments' time. On arrival at the new site, with equal celerity it can be fully established and going at full efficiency.

Incidentally, too, this is one of the most completely equipped paving outfits in existence. It has been consistently making a fine daily average of pavement actually laid.

When C. F. Lytle of Sioux City, "capitalist," found that as a result of Woodbury County lettings, he had in hand a 14-mile contract for concrete pavement with two or three settings of an outfit necessary and with other jobs in prospect of rather short mileage, he determined to organize an outfit and design a plant and equipment so that as little time as posible would be actually lost in the necessary moving. A central proportioning and mixing plant was selcted as best adapted for the work on hand and in prospect. A railroad flat car of ordinary type was one of the first purchases. On one end of this was mounted a Lakewood mixer of 56 cubic feet capacity per batch. On the other end a Wisconsin engine was mounted with a belted drive connecting to the mixer. The engine was housed in with a wooden cabin for protection from the elements. Fabricated steel was used to build a frame work about the mixer to support the necessary hoppers above for sand and gravel and with heavy bolted removable supports to rest upon the ground and give stability to the outfit. Two long canvas belt carriers extending directly along the car side at the back of the mixer provide two separate elevators for the cement, which is dumped from the sacks into the carrier hoppers from the cement supply cars at either end of the mixer car. Two cement carriers are necessary to keep an unbroken supply of material. When working at full capacity, one carrier with one crew emptying cement sacks into the hopper at the bottom can not supply the mixer. Fourteen full sacks of cement are required for each batch. The two carriers also make unnecessary a complete shut down of the mixer equipment while one cement car, after being emptied, is run out and the new one brought in.

A locomotive crane is one of the handiest and busiest pieces of equipment about the plant. The crane unloads the sand and gravel from the supply cars into the reserve stock pile. It keeps the hoppers at the top of the proportioning bins filled and ready for dumping as each new charge is required. When cars need to be shunted about, it does the shunting. If the cook shack and dining-cars are to be moved or a load of lubricating oil or gasoline brought in from the side track where the freight-train crew left it, it is not necessary for this Lytle plant to wait until the local freight comes through next day to have the job done. The crane simply swings its long boom into line and is ready for business as a freight engine. It does all the odd jobs about the camp which are too big or too heavy for the trucks to do and it is busy practically every minute of the day.

But the real show part of the Lytle camp equipment is the line of Kissel trucks when they report in from the final trip of the day or for the noon meal. Twenty of these special Kissel road-builders' trucks are equipped with automatic hoists and pneumatic tires, the front 36x6 and the rear 44x10. These trucks, moreover, are no juvenile affairs. They are high powered, of mamoth size and carry huge loads. For instance, the single batch of wet concrete they carry weighs over 4 tons. The tire equipment alone, on this set of trucks, represented when new an outlay of $20,000.

A fully equipped repair shop with competent foreman and several mechanics is maintained to keep the trucks and the balance of the equipment in the best condition at all times. When a truck has tire or any other trouble out on the road, the first truck passing carries the word to the repair shop and a service truck, fully prepared, if possible, to meet the needs of the emergency at hand, makes the run with very little loss of time. If the repair can be made on the spot by the roadside in short order, it is unnecessary usually to switch the load of wet batch concrete to another truck. If the repair requires too much time, the batch is usually transferred and carried on to its destination. Very few loads of material have been lost because of the delay of a truck while en route with its load. The trucks, even when loaded, travel at a high rate of speed and the wet concrete batch has been successfully transported a distance of 8 miles without detriment. The entire round trip at the time the 8-mile run was being made took approximately 1 hour. So carefully have the mechanical needs of the trucks and other equipment been looked after by the repair shop, and its force of men that in four months' time practically no delay has been experienced on account of having to make repairs on equipment during working hours.

A Lakewood subgrader is used to shape up the grade and a finishing machine of the same make, shapes, tamps and gives the finishing touch to the concrete slab. This machine is followed by hand finishers who complete the work of surface finishing, build the sloping integral curb on steeper grades and the special design drainage intakes. The latter are built into the edge of the slab at the curb line.

Caring for its equipment does not absorb all the attention of the company. To keep the men satisfied and contented on the job has been one of the features which has led to the good construction record made by the company.

To house the kitchen and dining room, two box-cars of the Palace horse-car type were purchased. One was entirely rebuilt inside and equipped, at one end, with a complete camp kitchen outfit. This contains all supply bins, shelves and refrigerator. The balance of the car not needed for the kitchen was rebuilt as a small dining room. The second car was entirely equipped as one large dining room. It is possible to seat comfortably, in the two rooms, a total of 75 men at one time. Sleeping quarters for the men are provided in tents or frame buildings if the latter are available or the time on the job seems to warrant. A special cook shack and sleeping quarters are provided for all colored help on the job.

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will be strong opposition to any form of tax being levied. At present the only tax they are subjected to is the personal property tax on their cars; the hit and miss local license tax imposed by some cities and the federal tax of $10 and $20 per car per annum, with the state motor vehicle tax, making a total of something less than $50 per car per annum, while if they paid on a gross receipt tax it would run from $500 to $1,500 per car per annum.

Roads Built by Forest Service

During the past year the Forest Service, United States Department of Agriculture, constructed 724 miles of minor roads at a cost of $540,868 and 2,959 miles of trails at a cost of $519,429. Three hundred and eighty miles of major roads were constructed for the Forest Service by the Bureau of Public Roads at a cost of $4,620,326. In addition, 3,007 miles of major and minor projects were maintained at a cost of $187,162, of which $65,336 was secured from local authorities. Forty-two hundred and ninety-four miles of trails were maintained at a cost of $113,683. This represents a total expenditure for the construction of roads and trails during the year 1921 of $6,456,694, which includes $2,153,522 coöperative funds secured from states and counties.

Expenditures to January 1, 1922, for constructing 3,729 miles of major roads total $15,301,373, of which $5,681,451 are coöperative funds. Likewise 4,856 miles of minor roads were constructed by the service at a cost of $2,752,970, including $773,922 of coöperative funds. To date $1,917,169 have been expended in the construction and maintenance of 12,448 miles of trails. The total thus far expended upon equipment amounts to $651,608, while $920,134 was expended upon overhead and administration by the Bureau of Public Roads and Forest Service.

To date a total expenditure of $22,216,724 for the construction of 4,786 miles of roads, 6,711 miles of trails and the maintenance of 3,007 miles of roads and 5,737 miles of trails has been made.

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Electrics in Express Service

By EDWARD E. LA SCHUM

General Superintendent, Motor Vehicle Equipment, American Railway Express Company, New York

IT OFTEN happens that the merchant or professional man is so busy in his particular line of effort that he overlooks many important factors connected with big business which are necessary for successful management. One of the important factors connected with most business institutions is the haulage or trucking proposition, and if we could bring to light some of the underlying principles of motor trucking, if we could have them thoroughly understood and recognized, we would do much to solve one of the important factors with which the general manager is confronted daily.

The principal reasons for using motor trucks in haulage are: (1) increased economy, (2) increased volume of business, and (3) greater satisfaction. In some installations the truck buyer has been able to obtain several or all of these advantages.

There are businesses in which the increased volume is so great that the factor of economy is temporarily lost sight of, or becomes of secondary consideration. In other lines economy will be the prime reason for considering motor trucks, the volume of business being secondary. In many instances both will be given due consideration. No two businesses are exactly alike; even in the same line of business no two trucks are handled exactly the same. For this reason it is impossible to predict in advance exactly what a motor truck will do; too many variables enter into the problem. It can, however, be estimated closely.

It is now generally understood that on long hauls motor trucks are cheaper than horses. This is true when the loading and unloading time bears a reasonable ratio to the actual hauling time; under these circumstances it is impossible for horses to compete with motor trucks. On short hauls, where the difference is not so great, the prospective customer must have pointed out to him the advantages of quick loading and unloading facilities, demountable and detachable bodies, self dumpers and interchangeable forms. The prime advantage of these is to keep the mechanical part of the installation, the chassis, moving on actual haulage the largest possible part of the time to bring the short-haul business into the same class as the long-haul, where its ecenomy is indisputable.

A motor truck increases the area in which business can be done in about the ratio of its daily mileage. The maximum daily horse mileages in heavy and medium heavy haulage are 20 and 24 miles respectively. The average is not more than half this—12 and 14 miles. A motor truck can cover from 30 to 100 miles a day readily, although it is seldom as low as 30, and not often above 60; the average is below 40.

The greater mileage of the motor truck may be used to give better and more frequent service within the area formerly served by horses. Or it may be used partly to extend the area and partly to improve the frequency of delivery.

An electric motor truck is precise and accurate. It is not affected by weather or road conditions, as compared with horse service which is seriously interfered with and sometimes stopped by the snow and ice of winter and the excessive heat of summer. There is no limit to the electric motor trucks' endurance; it is simply a question of drivers and batteries. This is advantageous during rush seasons or at rush times of the day or month, since no extra delivery service need be rented or otherwise provided for.

As pointed out above, the motor truck saves time in every possible way, in running time; through greater speed in loading, unloading and routing; by the greater efficiency which its use inspires in all other works; by its continuity or maintained speed as compared with the need of horses for occasional rest; indirectly, through the firm's reputation for being up-to-date, businesslike and hustling.

The mechanical equipment is precise and regular, instilling in the employes similar regular and exact habits. When well started, after proper installation, motor equipment allows the owner to forget his delivery service.

We have found electrics to be entirely capable of climbing heavy grades as are found in such cities as Kansas City, St. Louis, Minneapolis, Denver, and other places equally hilly. They are used by the American Railway Express Company generally in congested districts, but we have no hesitancy in placing the larger capacities such as the 3½ and 5-ton on what we know as transfer service, where the run is continuous from one point to another and where the loads are heavy, distances making no difference as long as the day's mileage does not exceed 40 miles, which, we have found to be about the capacity of batteries properly selected.

Batteries should be selected with the same care by a capable engineer in order that trucks may not be equipped with batteries of too little capacity, and at the same time in order that they may not carry excess weight by being equipped with overcapacity batteries.

After batteries have been selected careful attention should be given to the installation of charging apparatus, and we have always found battery manufacturers willing to lend every assistance in installations of this kind. We have noticed that the electric light and power companies' contract and engineering departments have been willing to coöperate with us, and in some cases have actually looked after the installations.

The American Railway Express Company commenced buying motor vehicle equipment in 1907. We are now operating 1,500 electric trucks in 23 cities—an average of 65 per city. Our records show that our machines are entirely free from the excessive speeding, which is exceedingly dangerous to life and destructive to property, and with the greately increased use of trucks is showing the destructiveness of high speed. Heavy motor trucks, due almost entirely to the selfishness of the operator, who is determined to "get there at any cost," places the superior, economic advantages of the modern motor truck in a false position.

The advantage of the electric is that, with the possible exception of coasting down grades, it can not be driven at an excessive rate of speed. Head-on collisions are the exception rather than the rule, and in reviewing our accident reports we find the truck rarely implicated. This, we believe, is due to its simplicity and ease of control, and especially to its continuous and even rate of speed, there being no change for the operator to perform in a spectacular manner, therefore no sudden bursts of speed which are very likely to result in trouble. The continuous torque of the electric motor, or the cushioned application of power, makes skidding practically an unheard of thing, and the fact that the electric can be operated with the minimum demand on the mental and physical abilities of the driver makes it most advantageous from the standpoint of safety.

ANOTHER advantage in favor of the electric is that it is practically free from fire hazard. While we have had electric trucks, on fire, and some of them seriously damaged by fire, we know that these were due to the human element and not chargeable to the truck itself. Since the human element to a certain extent is beyond our control, we believe the electric is the safest type of vehicle from the standpoint of fire hazard, all of which, of course, enables us to insure them at a much lower rate than other types of vehicles.

We have found the electric capable of standing up in the service for a period covering some 11 years, as we still have in operation some of the vehicles which were purchased in 1907. As a matter of fact, the electrics being manufactured today should, I believe, be economical for as long as 20 years. There are comparatively few wearing parts, and since they are generally rotating parts, and, since lubrication of all wearing parts is positive, by the simple method of replacing a few of the worn parts I see nothing to hinder continuous operation for a very long period. While these electrics are being operated for a very long period the user does not have to invest heavily in parts or repair material, and the operator will find that in a

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Milk "Fresher by a Day" Through Trucks and Good Roads

By J. W. LAFFERTY

Superintendent, Scott-Powell Dairies, Inc., Philadelphia

The combination of good dairy country in the vicinity of an extensive market with paved roads and motor trucks has enabled the Scott-Powell Dairies of Philadelphia to deliver milk at their customers' doors within 24 hours after the milk is produced at the farm. Capitalizing the advantages of this superior transportation medium, the Scott-Powell Dairies have adopted the slogan "Fresher by a Day" as a means of advertising a service which brings milk in glass-lined tank trucks from the neighboring counties to a Philadelphia distributing station and supplies it to customers 24 hours fresher than was possible with the old transportation methods.

The realization of the plan which made the rapid delivery of milk possible was the result of a carefully planned policy, brought to fulfillment by the extensive highway improvements carried on by the Pennsylvania State Highway Department. The Scott-Powell Dairies realized the possibilities of this method of transportation long before the highways were capable of carrying motor trucks 365 days of the year on established schedules.

An experiment in hauling milk to Philadelphia was made about 10 years ago. An opportunity for renting two idle trucks during the winter time presented itself and the trucks were employed on a cost basis to collect milk from several receiving stations along the old Lancaster Pike, now Lincoln Highway. Both trucks operated on a 50-mile haul, and, while the condition of the roads made the trucking of milk commercially impossible, the experiment convinced the officials of the dairy company that with adequate highways and proper hauling equipment this method would be practical.

Knowing that the highways would sooner or later be improved and that the motor truck also would constantly be improved, the Scott-Powell Dairies formulated their policy. The three richest dairy counties nearest Philadelphia—Lancaster, Chester and Delaware—were selected as the field from which the milk would be supplied. Supply stations were located along the highways within a 60-mile radius of the city and the farmers were encouraged to concentrate on dairy farming.

About this time the state of Pennsylvania through its highway department undertook to build mile after mile of all-weather highways to meet the requirements of enterprises like this which depended on efficient highway transportation for further development. Before long Lancaster, Chester and Delaware Counties had a network of concrete highways which permitted certain operation of highway transport in any kind of weather. Two years ago the time was considered ripe for hauling by truck and gradually the transportation medium was changed from rail to highway. To-day more than 100,000 quarts of sweet, fresh milk are received at the distributing station in Philadelphia by motor truck. Usually 16 trucks, each bringing in milk from receiving stations 50 to 60 miles away, make daily trips over the smooth, weatherproof Pennsylvania highways.

Along with the improvement in highway conditions came a corresponding improvement in hauling equipment. Milk was first hauled to town in cans in open, unprotected trucks. Then came the refrigerator truck and last came the glass-lined tank truck. These trucks carry cork insulated glass tanks built on the principle of the "thermos" bottle. The clean, seamless glass tanks afford no lodging place for dirt and bacteria and are quickly and easily cleaned. The milk is kept cool and sweet during its 50-mile trip over the paved highways to the distributing plant. As a further step in efficient service, horse drawn delivery wagons are being replaced by electric trucks. Good roads in the suburbs make this possible.

Besides their creameries, the Scott-Powell Dairies have established loading platforms on the Lincoln Highway. Farmers who cannot reach the creamery put their cans of milk on loading platforms, where they are picked up by the dairy trucks. Telephone stations have been established every 10 miles to keep tab on the trucks summer and winter.

When the method of transportation was changed from train to truck, it was not expected that any savings in transportation costs would result. The object of changing to truck haulage was to save time so that the people could be supplied with fresher milk. But when the new method of transportation was in full swing it was found that, besides realizing their fullest expectations in the matter of time saving, they also were enabled to collect their milk at the distributing station in Philadelphia at a decided saving in transportation costs.

An intensive advertising campaign was inaugurated after the dependability of the highway transport method to make earlier delivery of milk had been demonstrated. The advertising slogan selected was built on confidence in the everyday efficiency of the improved highways and modern hauling equipment. A big and prosperous business enterprise developed from faith in the practicability of highway transportation.

In order to maintain during the winter time the dependability of the service on which the business was founded the highways had to be kept clear of snow to allow the uninterrupted operation of the trucks. The work of the State Highway Depart-

shop properly organized the electric can be overhauled when necessary in a very short time.

The American Railway Express Company frequently overhauls and paints an electric truck in 6 working days, thus materially reducing the days out of service, and taking this into consideration and the electric's freedom from accident troubles, we have found it possible to operate them easily 280 out of 300 working days.

The fact that electric trucks have proved so satisfactory in the service of the express company, brewers, department stores, and to many other concerns who have used them extensively, should be conclusive proof of their dependability, but they seem to be surrounded by an air of mystery which, I believe, could easily be removed by coöperation on the part of the electric truck manufacturer, the battery manufacturer and the central stations by the simple method of furnishing detailed information through advertising or, perhaps better still, by providing field engineers who could devote their time to the intelligent analysis of trucking propositions. I believe that all concerns having a trucking proposition to solve would be glad to have a transportation engineer undertake an analysis of their trucking propositions and would use the electric to a very great extent as soon as they were shown its advantages. In this I believe the truck manufacturer and the battery manufacturer should take the initiative because they have the products of their factories to dispose of. On the other hand, while the truck manufacturer accomplishes a sale, that sale must be looked upon as a single sale, as they may not sell another; whereas the installation of an electric truck creates a continuous demand for electricity sold by the central station, and inasmuch as a truck battery is usually charged during the night, or the off-peak period, it seems to me that the central station should be interested in getting more and more of this kind of business, which must act as a balance wheel, or to straighten out their load curve.

PERFORMANCE AND COST OF AMERICAN RAILWAY EXPRESS COMPANY TRUCKS.

Months of 1919.	No. of Trucks.	Mileage Service.	Days in Service.	Electricity.	Body Repairs.	Chassis. Repairs.	Garage Expense.	Total Cost.
March	18	4,862	347	$ 332.61	$293.00	$ 22.50	$ 509.76	$1,157.87
April	18	7,744	485	523.52				
				*4.32	50.00	32.50	493.92	1,113.26
May	18	8,807	508	328.50	142.60			
				*9.00	18.00	19.50	488.52	1,006.12
June	18	8,678	722	305.98				
				*4.50		19.00	484.02	813.50
July	18	7,381	595	270.60	Tires	11.25	447.52	755.12
				*8.00	17.75			
Total		37,472	2,657	$1,787.03	$530.35	$104.75	$2,423.74	$4,845.87
Average per month	18	7,494	531	$3 357.41	$106.07	$ 20.95	$ 484.75	$ 969.17
Average per vehicle per month		416	29	$ 19.86	$ 5.89	$ 1.16	$ 26.93	$ 53.84

Average cost per mile, per vehicle, $1.29. *Battery repairs and miscellaneous.

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Turnover and Profits in Relation to Quantity Selling

By "OLD DEALER"

THE interest of every business man is to make his capital do as much work for him as possible. This means letting a given sum of money rest in a given lot of material for as short a time as possible. And doing this means moving stock as soon as possible. The one word that covers all this is "turnover."

It is never possible to make profit on money that is tied up in commodities that will not move. And when prices are falling it is easy to lose a great deal of money by holding merchandise that moves slowly, while the price for which it can be sold becomes constantly less and less. Because of this, every dealer ought to have information on the movement of goods in and out. It is this movement in and out, not only for the merchandise, but also of that which the merchandise represents — i.e., money — to which the term "turnover" has been applied.

In any business there are two things that are disposed of, replaced and disposed of again—or, in other words, "turned over." These are:

(1). The stock of merchandise.

(2). The money invested in such merchandise.

And the turnover of these items has a very definite effect upon the profits made by the business during a given period. Hence an analysis of this effect is necessary in order to plan properly and conduct the business so as to:

(1). Secure the maximum profit with a given capital; or

(2). Secure a given profit with a minimum capital.

Perhaps the easiest way to state the case for a rapid rate of turnover in business is as follows:

A certain dealer, we will say, has annual sales of $100,000, and makes a gross profit of $35,000 (or 35 per cent. of the sales). If we take off $25,000 for expenses (25 per cent. of the sales), the net profit would be $10,000 (or 10 per cent. of the sales). But if the annual sales of that business are increased to $200,000, and a gross profit of 35 per cent. is still realized, the amount of gross profit would be $70,000. Suppose expenses of the business are doubled because of this increased business—a very liberal margin—there would then be $50,000 in expenses to deduct from the gross profit of $70,000, leaving a net profit of $20,000.

Now it is at once evident that, having increased the sales to such an extent, the same percentage of profit is not required. The tendency in any business should be to increase the turnover and thereby decrease the percentage of profit. Under these circumstances the nation as a whole would benefit, and the individual engaged in the business would certainly not suffer.

Another illustration: Two men are engaged in road-building. John Smith, the first contractor, finishes 12 jobs a year, making $10,000 net profit on each job. He earns a total of $120,000. Jim Jones, the second contractor, finishes 18 jobs in a year, making $7,500 on each job. He earns a total of $135,000. Moreover, he gets business away from Smith because his prices are more attractive.

When a dollar earns ten profits for its owner in a year, the owner can afford to take a smaller profit each time than on another dollar which earns him only five profits during the same time. And yet the dollar which returns the smaller rate of profit will bring in the larger volume of profit simply because it is so much more active.

Now this is precisely the point that so many business men seem to misunderstand. They do not grasp the fundamental principle that even though the percentage of profit on merchandise or service be but 5 per cent., if it is earned often enough, say, ten times in a year, the annual turnover on money or rate of profit on investment will be 50 per cent.

Too many dealers overlook the fact that their cost of doing business of, say, 25 per cent., can not correctly be used to demand a 15 per cent. margin of profit on each and every kind of merchandise sold, because it is the percentage of profit on one sale, and not on the year's investment. A larger margin of profit needs to be added to the slow-moving materials, and a smaller margin to the quick-moving.

The vital point of comparison is how much profit can one make a dollar earn selling a given thing. Any business man can get rich earning a 5 per cent. margin of profit on one certain commodity, if he sells it often enough; on the other hand, he may go bankrupt on merchandise offering 100 per cent. profit if he rarely makes a sale. Quantity selling is the greatest modern profit policy. The profit on any one article or commodity is not much, but when this profit is multiplied by 1,000 or 5,000 or 10,000, the profit on the volume becomes considerable.

Lazy capital, unnecessarily high profits, and sluggish business all tend to go together. The business man who makes money in spite of conditions—and there are many such—are those who go out aggressively to make their dollars active.

The rate of turnover for a given time depends on just two things:

(1). The average amount of money invested in the merchandise.

(2). The sales of the merchandise in the period.

Both amounts must be stated in the same terms in order to get a correct result. That is, the average amount invested and the sales must both be figured at the cost price, or at the selling price. It does not matter much which way they are figured so far as the accuracy of the result goes; but it does make a decided difference if one of the elements is figured at one price, and the other at the other price. The result in that case is a figure that means precisely nothing.

It is obvious, then, that since these two elements only are involved, the problem of increasing the rate of turnover depends on these two, and no others. Hence, one or both of two things must be done:

(1). The average amount of money invested in merchandise must be decreased, relative to the volume of sales; or

(2). The sales must be increased, in a greater ratio than the increase in the merchandise investment.

The rate of turnover may be found by dividing the yearly net sales by the equivalent merchandise investment.

By "equivalent merchandise investment" is meant a constant yearly investment in merchandise which is equivalent to the actual merchandise investment over a period of one year.

This means that the "equivalent merchandise investment" must be expressed in terms of times as well as of money. The fundamental unit in which equivalent investment is expressed is the dollar-year. It may also be expressed in some related unit which is reducible to dollar-years, such as dollar-months or dollar-weeks.

In explanation of this, one dollar invested for one year is a dollar-year. Two dollars invested for six months, or three dollars invested for four months, or 50 cents invested for two years, are all exact equivalents of a dollar-year.

Thus, if one invests $5,000 in a certain article or commodity twice a year, he has an equivalent investment in that particular article of $2,500. Suppose the sales of this article for the year to be $10,000. By dividing the equivalent investment of $2,500 into the sales of $10,000 you find that your rate of turnover is 4. If you invest $5,000 in a given article every three months, you have an equivalent investment of $1,250. If your sales of that article for the year amount to $25,000, your rate of turnover is 16.

A business man pays a certain amount for the goods he sells, and he sells them for a certain other amount, usually greater than the first. It is the difference between these that determines the success or failure of a business. The merchandise itself is only a means to an end.

For certain reasons, a merchant may want to invest as little money as possible in stock. The turnover of this investment, then, becomes of great importance, for he must get his original investment back before he can invest it again. This turnover is dependent largely upon the movement of the goods, but the unit profit and the extention of credit also play an important part. An analysis of the turnover will largely determine the advisability of extending more or less credit and the amount of unit prof-

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ment in this respect has been of especial value, and now the Scott-Powell Dairies have purchased 3 large plows and 2 tractors for removing snow. During one severe snow storm the dairy officials turned out and helped the highway department in keeping their main lines of traffic open.

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Snow Removal a Problem That Must Soon Be Faced

EXPERIENCES OF EASTERN AUTHORITIES

With the season close at hand when 25 per cent. of the nation's highways may be made impassable by snow and with the urgent need for the railroads to receive, in the face of rising trade activities, all the aid possible in serving the public with transportation, serious consideration is being given the problem how best to contend with the task of keeping the highways clear of snow.

The country has spent many millions of dollars in constructing highways. If these avenues of transportation are blocked three months in the year the income from them is cut one-quarter and there is as well a serious dislocation of traffic.

In many states trucks have been used very successfully for battling with even the heaviest snowdrift. Municipalities in particular have found this means of great service in keeping the lines of communication and transport open.

New York City, for example, coped with a tremendous storm in February, 1921, which deposited 12½ inches of snow in 23 hours, by calling into service "tank" type tractors, blade graders, push plows and motor trucks to dispose of about 11,500,000 cubic yards of snow. Two hundred motor trucks had already been purchased by the city and these, together with the other equipment mentioned, handled the vast mountains of snow with little interruption to traffic and with great satisfaction to the city's merchants in the shopping districts.

As far as snow removal and drift prevention on highways is concerned, its principal requirement is comprehensive, quick-acting general maintenance together with preparedness in regard to equipment. Here, again, the motor truck and tractor, with plow or drag attachment, plays an important part. Two years ago a special test of snow removal work was made in keeping open for United States motor convoys the 225-mile route across Pennsylvania from Ohio to Maryland. The patrolmen, according to George H. Bil, assistant commissioner, Pennsylvania Highway Department, who were regularly employed on the highway, formed a nucleus to create the larger forces necessary. Each patrolman was assigned a section and instructed to telegraph a statement of conditions to headquarters. If conditions were abnormal an immediate inspection was made and steps taken to expedite the work.

Work began by breaking a track with road drags and small V-haped plows. This was followed by road machines or motor trucks with plow attachments ahead. Turnouts were made at intervals and the track was gradually widened as soon as possible. It was deemed important to open the entire travelable width of highway in order that traffic would not cut through to the road service during periods of freezing or thawing. The snow was at first removed to within three inches of the road service and what did not melt afterward was removed entirely.

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it necessary with the given investment and the probable sales.

A knowledge of stock turnover by lines enables the dealer to segregate the fast moving lines from those that move slowly. It indicates the commodities for which there is a ready demand, and those for which a demand must be created. This shows him where to concentrate his advertising and sales effort. It enables him to apply different sales methods particularly adapted to the conditions. He can perhaps increase the percentage of profit on the slowness of movement, or possibly by decreasing his margin of profit the movement can be speeded up. His buying can be scheduled, so that his stock is always kept at the minimum.

In the final analysis it must be remembered that turnover is not an end in and of itself, but merely a means to an end, namely, yearly net profits. The banker can pay his overhead expenses and declare dividends only by daily turnover of cash on hand. The same problem confronts any dealer. His stock must turn a given number of times a year in order to yield a profit.

Mock Becomes Bessemer Manager

Following the report that the Bessemer Motor Truck Company and the American Motors Corporation would merge under the name of the Bessemer American Motor Corporation, comes the announcement that Ralph D. Mock has become general-manager of the Bessemer Motor Truck Company. He is known to the industry through his services as vice-president of the Hydraulic Pressed Steel Company of Cleveland, with which concern he was associated for a decade and also through past activities with the Motor & Accessory Manufacturers' Association. He was associated with others in the organization of the American Motors Corporation of New Jersey which has resulted in that company's financial rehabilitation.

The Bessemer plant reports greater sales in November than in any preceding month of this year and also appointed a number of new dealers and distributers. Mr. Mock stated that the Bessemer policy of maintaining factory branches in certain principal cities will be continued and the number of such branches increased. All factory branches will carry new trucks in stock for the convenience of dealers in surrounding territory in making quick deliveries.

Preparations are now being made for occupying the company's new plant at Holmesburg Junction in Philadelphia and certain additions to the personnel of the company will be made in line with the enlarged production program which will be carried out in 1923.

Price reductions of $405 and $285 on the two light models have been announced.

A survey similar to that conducted during the war emergency has been undertaken by business men in order to determine the number of motor vehicles ready for service, whenever a complete tieup of railroad lines is reached.

Adams Express Revives as Operator of "Money Taxis"

13 CARS IN USE; 150 TO BE ADDED

The Adams Express Company has definitely resumed active operations with the successful establishment of its armored car service. This promises to earn well and in no way conflict or compete with the operations of the American Railway Express Company, which in 1918 took over the express operations of the Adams, American and Wells-Fargo companies.

Armored car service was established last March, following a series of thefts in the financial district which caused many banks and other financial institutions to seek safer means for the transfer of money. It consists of a fleet of steel motor vehicles, popularly known as "money taxis," manned by armed guards and operators. These cars carry gold, currency and other valuables within the city only.

Adams operated 6 cars at first. Only recently has the service been definitely identified with Adams and the name printed on each car.

There is little overhead expense and the cost of inaugurating the service was not large, aside from the cost of the cars. All accounts are kept in Adams' executive offices at 51 Broadway, made possible by the local nature of the operations. The first 6 cars cost between $3,500 and $4,500 each and were of several types. Seven cars have since been added, most of them costing near $5,000 apiece. Each car carries five armed and uniformed men. The company expects to have 20 cars in service by January 1.

The success of the service has encouraged the company to lay plans for a fleet of 100 to 150 cars in New York within the next two years. Additional cars will be bought in larger numbers when the best type has been decided upon and it is possible that similar services will be organized in other cities. The most satisfactory type has a cupola top which provides ventilation but makes the interior inaccessible to throwers of tear and poison bombs. The body is built of heavy bullet-proof steel and has bullet-proof glass one inch thick in front of the chauffeur. Tires are rubber but non-puncturable. No attempts have been made to hold up any of the cars thus far.

Most Headlights Illegal

Sixty-nine of nearly 100 automobile headlight devices previously approved for use in New York state have been declared illegal. This action followed a recent hearing at which manufacturers of headlights of questionable legality had an opportunity to show cause why approval should not be withdrawn.

Several additional manufacturers will have a hearing soon and the final approved list will then be made public. Under the ruling now enforced manufacturers and users of the condemned devices are granted six months in which to dispose of their devices or fit their cars with legal headlight equipment.

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New York 'Buses Carried 52,840,135 During Year

OPERATING REVENUE REACHED $1,198,936

A considerable gain in traffic, operating revenue and net income for the year ended June 30, 1922, is shown in the annual report of the Fifth Avenue Coach Company filed with the Transit Commission of the State of New York, a synopsis of which is given herewith.

As compared with the previous year, the number of passengers carried at a 10-cent fare increased from 51,091,365 to 52,840,135; the operating revenue grew from $5,198,936.05 to $5,390,414.94; and the net income expanded by $50,273.15 to $1,167,998.88. Operating expenses rose $200,230.99 to $3,710,753.61, taxes $13,710.54 to $610,358.93.

Seven 'buses were added to the service during the year, bringing the total to 296. These made 661,433 round trips, traveling 9,683,500 'bus-miles (of which 199,735 were idle and 11,438 private hire), and working 1,180,096 revenue 'bus-hours including 2,633 private hire.

In maintenance tires stand at 0.83 cent per 'bus-mile, depreciation at 0.33 cent, repairs at 6.54 cents and superintendence at 1.48 cent. Conducting transportation shows 24.86 cents per 'bus-mile, accidents and damages 2.13 cents, traffic and advertising 0.14 cent and miscellaneous 2.01 cents. Taxes amounted to 6.3 cents per 'bus-mile, bringing the total operating and revenue deductions to 44.62 cents per 'buse-mile. Operating revenue amounted to 55.67 cents per 'bus-mile, made up of fares at 54.57 cents, livery service at 0.12 cent, and advertising and miscellaneous at 0.98.

Lectures for Electric Users

To meet the demand for information regarding electric motor truck operation and care brought about by the rapidly increasing use of the storage-battery vehicle for city deliveries, the Electric Motor Truck Association is planning a course of instruction covering every phase of electric truck maintenance. These lectures will begin on Friday, December 8, and will be given on the second and fourth Fridays of each month throughout the winter. They will be held at the Electric Garage, 62d street and Central Park West, New York, where there are complete facilities for studying batteries and their care, electric motors, the electric controllers and all the other parts of electric trucks. All the lectures will be given by men who are recognized authorities in their respective fields.

SYNOPSIS OF THE ANNUAL REPORT FOR THE YEAR ENDED JUNE 30, 1922, OF THE FIFTH AVENUE COACH COMPANY (CONTROLLED BY THE NEW YORK TRANSPORTATION COMPANY)

[N. B.—The figures given below are subject to such correction and revision as may be found necessary after a critical examination of the return, which will be published in greater detail in the Annual Report of the Commission for 1922.]

Statement of Operations.

	1922	Increase or (*)decrease.
Number of omnibuses (exclusive of 74 non-revenue 'buses and automobiles)	296	7
Round trips made during the year	661,433	42,282
Revenue 'bus-hours (incl. 2,633 "private hire")	1,180,096	51,819
Revenue 'bus miles (active, 9,472,327; idle, 199,735; private hire, 11,438)	9,683,500	491,675
Number of passengers carried at 10 cents	52,840,135	1,748,770

Income Statement.	Cents per 'bus-mile. 1921.	1922.	Amount	Increase or (*)decrease.
Total amount of fares	55.58	54.57	$5,284,013.50	$174,877.00
Revenue from livery service	0.16	0.12	11,451.50	*3,156.20
Advertising privileges and miscellaneous	0.82	0.98	94,949.94	19,758.09
Total revenue from operation	56.56	55.67	$5,390,414.94	$191,478.89
Maintenance (a):				
Superintendence, $105,553.32; shop expenses, $37,872.82	1.24	1.48	$ 143,426.14	$ 29,719.70
Repairs (omnibus bodies and chassis, $601,681.95)	5.51	6.54	632,905.16	126,833.37
Tires (b)	0.87	0.83	80,740.92	370.61
Depreciation (reserved)	1.57	0.33	31,802.46	*112,700.11
Total maintenance	9.19	9.18	$ 888,874.68	$ 44.223.57
Conducting transportation	25.18	24.86	2,406,959.55	92,180.58
Accidents and damages (c)	1.87	2.13	206,523.72	34,937.93
Traffic advertising	0.24	0.14	13.914.87	*8,586.86
General and miscellaneous	1.71	2.01	194,480.79	37,475.77
Total operating expenses	38.19	38.32	$3,710,753.61	$200,230.99
Taxes	6.49	6.30	610,358.93	13,710.54
Total revenue deductions	44.68	44.62	$4,321,112.54	$213,941.53
Income from operations	11.88	11.04	$1,069,302.40	*$22,462.64
Non-operating revenues (rent, $9,999.96; interest, $91,837.41)			$ 101,837.37	$ 8,614.74
Non-operating revenue deductions			3,140.89	*12,513.83
Non-operating income			$ 98,696.48	$ 21,128.57
Gross income applicable to corporate and leased properties			$1,167,998.88	*$ 1,334.07
Income deductions				*51,607.22
Net income for year			$1,167,998.88	*$50,273.15
Surplus adjustments—net deductions			(d)77.431.74	57,958.78
Net increase in corporate surplus			$1,090,567.14	*$ 7,685.63

Employees—Last payroll of June, 1922: Conductors, 453; drivers, 434; others, 520; total, 1.407. Total salaries and wages, $2,616,893.75 (inclusive of officers, $77,786.66); increase over 1921, $199.962.82.

Accidents—Killed, 3; injured, 781 (serious 19, minor 762).

(a) The rule of the Fifth Avenue Coach Company concerning depreciation of equipment filed with the commission provides for a charge to expense from January 1, 1919, "equal to 9.15c. per 'bus-mile, which is estimated to be sufficient and necessary to cover such wear and tear and obsolescence and inadequacy as may occur on all equipment." The basis includes non-revenue mileage (27,459). The amounts reserved after deducting the cost of repairs were $23,351.28 for depreciation of buildings and $12,039.33 of shop tools and machinery; for depreciation of equipment $3,588.15 was withdrawn from the reserve account and credited to maintenance.

Balance Sheet.

Assets:	As of June 30 1921.	1922.	Year's Increase or *decrease.
Cash	$ 344,555.92	$ 201,606.26	*$ 142,949.66
Accounts receivable	227,913.37	198,523.74	*29,389.63
Interest and dividends receivable	21.089.84	16.512.73	*4,577.11
Materials and supplies	352,372.57	413,559.25	61,186.68
Total floating capital	$ 945,931.70	$ 830,201.98	*$ 115,729.72
Motor 'buses	$1,351,958.03	$1,438,259.80	$ 86,301.77
Shop and miscellaneous equipment	207,579.50	240,534.65	32,955.15
Office furniture and fixtures	16,725.58	21,071.26	4,345.68
Organization	25 105.27	25,105.27	.....
Patent rights	1,277.21	1,645.14	367.93
Garages	817,561.81	1,232,840.65	(e)415,278.84
Real estate (land occupied by garages)	298,919.13	520,057.88	(e)221,138.75
Total fixed capital—gross	$2,719,126.53	$3,479,514.65	$ 760,388.12
Accrued amortization of capital—Cr.	824,098.21	(f)855,170.17	31,071.96
Total fixed capital—net	$1,895,028.32	$2,624,344.48	$ 729,316.16
Miscellaneous investments	$1,953,323.88	$2,447,120.04	$ 493,796.16
Construction in process	2 915.55	.....	*2,915.55
Prepayments	43,445.28	54,373.15	10,927.87
Guaranteed cost of tires in service (see note b)	14,232.67	15,816.13	1,583.46
Other expense	.....	2,705.69	2,705.69
Total—assets side	$4,854,877.40	$5.974,561.47	$1,119,684.07
Liabilities:			
Taxes accrued	$ 535,166.21	$ 544,700.69	$ 9,534.48
Miscellaneous accounts payable	266.006.86	148,690.92	*117,315.94
Working advances due to associated companies	4,166.67	550.00	*3,616.67
Reserve for injury and damage (claims)	169,049.23	284,108.78	115,059.55
Other reserves	12,655.72	(g)38,111.23	25,455.51
Capital stock	50 000.00	50 000.00	.....
Corporate surplus	3,817,832.71	4,908,399.85	1,090,567.14
Total—liabilities side	$4,854,877.40	$5,974,561.47	$1,119,684.07

(b) Reported as depreciation of tires. Based on the "'bus-tire mileage" at the guaranteed tire cost per mile, credit being made for tires which exceed the guaranteed mileage and for scrap.

(c) For payment of claims, the company charged expenses (and credited reserve) at the rate of 1¾ cents per 'bus-mile. Credits exceeded the payments this year by $115,059.55.

(d) Debits: Loss on securities sold and matured, $53.094.32; adjustment of federal taxes for period January to June 1921, $16,203.29; additional federal income tax, 1909 to 1917, $4.524.38; obsolete material scrapped, $4,523.65; adjustment of items pertaining to prior periods, $2.689.77; unamortized cost of equipment retired during the year, $1,685.86; bad debts written off, $484.27. Credits: Profit on securities sold and matured, $5,148.50; unclaimed wages, years 1919-1920, $421.33; profit on snow scraper sold, $193.92; bad debts collected $10.

(e) Purchase for $570.000 of land and buildings for garage and repair site from New York Transportation Co., July 1, 1922.

(f) Reserves for depreciation of vehicle equipment, $712,897.96; shop tools, etc., $63,203.03; buildings, $79,069.18.

(g) Reserve for depreciation of uniforms, $10,303.76; workmen's compensation insurance $27,807.47.

STATE OF NEW YORK—TRANSIT COMMISSION,
Bureau of Statistics, November 3, 1922.

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Mine-to-Railway Coal Hauling by Motor Truck

By GEORGE T. WALLACE

Pitcairn, Pennsylvania

THE region around Pitcairn is covered with coal mines, and I am engaged in hauling coal direct from mines to cars. This work is being done with a 3½-ton truck which I purchased April 1, 1920. During the last year and a half it has worked for various coal mines. At present it is hauling for the Bolton mine, just outside Pitcairn.

Ordinarily the truck works every working day in the year; but there was a four months' period during the summer when work was so slack that the truck was practically laid up. During another six weeks' period, when coal mining was rather dull, the truck was put on gas-well rigging work. This is the hardest kind of service for a truck, because it has to go over the worst roads possible and carry any load that is put on it.

In coal hauling the average load is 6 tons, which is somewhat of an overload. But I drive the truck myself, and am very careful, and the low repair costs show that the truck is not being abused. Speed in handling is essential in this work, and the truck must carry a maximum load each trip.

The truck is hauling direct from a mine tipple to railways cars, in which the coal is shipped to the Westinghouse Electric & Manufacturing Company in East Pittsburgh. At the mine the coal drops directly from the tipple into the truck, and a load can be taken on in a few minutes. At the other end of the trip the truck runs on a high platform, from which it dumps direct into the railway cars.

We averaged 12 trips a day, which means a total of 72 tons in a 10-hour day. At times we have hauled as many as 18 loads in a day by working overtime; then the maximum daily tonnage was 112. On this job the distance from the mine to the cars is about 2½ miles, and this is about the average length of our hauls.

Until a few months ago we had the worst kind of roads to run over; but a new concrete road recently finished should materially decrease our expense for tires and gasolene. In spite of bad roads and overloading, the truck has cost only $100 for repairs, in addition to the half hour a day that I spend oiling, greasing, inspecting and tightening it up.

I have allowed $199.60 for my own time, figured at 80 cents an hour for the period of 18½ months. In calculating the costs, we have allowed $400 a year for repairs in addition to the half hour a day of my own time, and feel that this will easily cover the actual costs.

We figure on running the truck three years, or 39,000 miles. It may last longer than this, but we want to be conservative. We have been getting only about 8,000 miles on tires, but this was due to the bad roads, and we expect to do considerably better in the future. The truck averages 4½ miles to the gallon of gasolene, though the "gas" consumption varies with the job. On the present job, the consumption is very low, because the loads are carried down hill, while the empty truck returns up hill.

I drive the truck myself, but allow $6 a day wages whether the truck works or not. My entire time is devoted to the business of hauling, and if I can't get work, my idle time is a legitimate charge against the truck.

The truck—a Selden—costs $27.17 a day, 50 cents per mile, 377 cents per ton, and 165 cents per ton-mile. These are very low costs, so that it is not difficult to make a profit at the prices which can be obtained for coal hauling. Up to September 15, 1921, the hauling rate was 60 cents a ton. Since then it has been cut to 40 cents a ton. In the period covered, I figure that we have hauled 24,768 tons at 60 cents a ton, and 2,016 tons at 40 cents a ton, making a total income of $15,667.20. Since the truck cost a total of $10,104.39 to operate, the net profit was $5,562.81 for the period of slightly over one and one-half year. Of course this profit is in addition to the wages I allow myself as driver.

Since our average cost has been 377 cents per ton, and we are now getting 40 cents a ton for hauling, it might appear that our profits would be almost nothing from now on. This is not the case, however, because our costs of operation are dropping considerably. As an example, take tire expense. On the old rough roads we averaged only 8,000 miles to a set. But on the new roads we can easily make 12,000 miles. Then, too, the cost of a set of tires such as we use has dropped from $606.50 to $476.30. This makes the tire cost per mile 3.97 cents, instead of 7.58 cents, a saving which amounts to $1.96 a day, or 2.72 cents per ton. Similarly gasolene and repair costs have also come down, so we shall be able to make a good profit even at 40 cents a ton.

A detailed statement of costs follows:

OPERATING RECORDS.

Total Period.

Period covered	18½ months
Days operated	372
Total round trips	4,464
Deliveries—pickups	4,464
Total loads—tons	26,784
Miles traveled	20,168
Gasolene used—gallons	4,482
Cylinder oil used—gallons	186½

Daily Averages.

Round trips	12
Deliveries—pickups	12
Total loads—tons	72
Miles traveled	54.2
Miles per round trip	4.5
Tons per trip	6
Ton-miles	162
Miles per gallon gasolene	4.5
Miles per gallon oil	108

COST RECORDS.

Investments.

Chassis	$ 4,325.00
Body and hoist	600.00
Cab	80.00
Extra for special tires	240.50
Total investment	$ 5,245.50
Tire value	606.50
Total, less tires, to be depreciated	$ 4,639.00

Fixed Charges—Yearly.

Interest on total investment, (3 yrs.) at 7%	$ 244.79
Taxes and licenses	125.00
Insurance	400.00
Garage expenses	68.50
Total per annum	$ 838.29
Total per month (per day $3.49)	69.86
Total for period—372 days	1,298.53

Variable Charges—Period.

Fuel at 24 cents a gallon	$ 1,075.68
Cylinder oil at 75 cents a gallon	139.88
Tires—20,168 miles ($606.50 ÷ 8,000-mile life)	1,528.73
Depreciation—20,168 miles ($4,639.00 ÷ 39,000-mile life)	2,397.97
Maintenance and repairs (estimated)	819.60
Total variable charges (per day $16.03)	$ 5,961.86
Driver's wages—(per day $7.65)	2,844.00
Total fixed charges	1,298.53
Total operating costs	$10,104.39

Unit Costs.

Cost per day operated	$ 27.17
Cost per mile traveled	.50
Cost per ton hauled	.377
Cost per ton-mile	.165
Repair cost per mile—estimated	.041
Repair cost per mile—actual	.015

Fuel Specifications Approved

The Interdepartmental Petroleum Specifications Committee announces that its latest revision of the federal specifications for petroleum products was approved by the Federal Specifications Board on October 31.

The one outstanding change in the specifications is in motor gasolene, the initial boiling point being lowered to 55° C. (131° F. (and the 90 per cent. point raised to 200° C. (392° F.). When the specification for motor gasolene was last amended in 1919, it was hoped that it would be satisfactory for at least two years. It has actually been in effect three years, and improvements in the refinery practice in this period have indicated that the specification could be modified to advantage. This has accordingly been done. The specification for domestic aviation gasolene has been modified to allow the use of cracked gasolene in cases where the material is to be used within three months. A corrosion test has been substituted for the doctor test in the specification for mineral spirits. Grade 2 of Liberty aero and motorcycle oil has been dropped, as this oil is not being purchased at the present time. A few minor changes have been made in some of the other specifications.

The specifications in force previous to October 31 are given in Technical Paper 305 of the Bureau of Mines, and the methods adopted by the committee for testing petroleum products in Technical Paper 298. It is planned to publish the revised specifications, together with the testing methods, as Technical Paper No. 323 which will be issued by the bureau as soon as possible.

The Interdepartmental Committee held an open meeting on July 3, and comments and criticisms on the specifications and testing methods were considered, and such changes as were adopted are incorporated in the revised set of specifications.

Announcement is made by the new Bethlehem Motors Corporation of the recent appointment of distributers and dealers as follows: Ebert Motor Truck Company, Philadelphia; Merchants Automotive Corporation, Newark, New Jersey; Bethlehem Motor Department, Pacific Land Company, Los Angeles.

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Paying for Highways and Their Care

By A. J. BROSSEAU
President, International Motor Company

WE ARE proposing that this generation shall undertake to build roads, charge the cost to capital acount, pay for them by long-term bonds, use them and pass them on to the next generation in as good or better condition than when we built them. We propose that each generation shall pay a fair rental charge for the use of these roads in the sum of amortization charges, and interest, plus maintenance, Shall we not, then, proceed as would a business man, or a farmer, when setting up his establishment? The full cost of the factory or the farm would not be assessed against the first year's income, but would be caried over a term of years, during which time the returns would be enough to meet all charges and a pay profit as well.

An ideal program of highway finance should include:

(1) The preparation of a construction budget by every state, estimating the cost of the primary and secondary roads to be built, year by year, for the next ten years.

(2) Based upon the stage of development of that program at this time, the cost of construction— all or part—shall be met by bond issues, except those states where the construction program is practically complete.

(3) A budget of current operating costs shall be set up to defray interest on bonds, amortization charges and maintenance. The amount necessary to pay interest and amortization should be included in the general tax levy. The cost of maintenance should be assessed against the user.

(4) All expenditures should be under the control of the state highway departments.

(5) Regulatory powers should be as flexible as possible and lodged only within the state highway department, to be administered in accordance with the needs of the public.

As a summary for consideration where state highway bond issues are necessary, we propose that:

(1) Bond issues should be serial in form and issued for as long a period as 50 years. The fund should be expended under rigid engineering control, and provision must be made for sufficient current income to pay interest, amortization charges and adequate maintenance.

(2) Interest on bonds and amortization should be paid for from general taxation. Maintenance costs should be charged against traffic.

(3) Maintenance should include all charges up to and including construction, save where an inferior is replaced by a superior type of surface.

(4) Only that type of road shall be constructed which is adequate for the needs of the present and future traffic. This shall be determined by careful surveys both of traffic and economic possibilities.

A survey of highway development as it is today shows that we are annually appropriating sums aggregating more than $1,000,000,000 for city and rural highway construction and maintenance. A further survey of our needs shows that this program must be continued for ten years or more, if we are to arrive at a connected system of highways which will render the greatest possible service to the public.

If we were dealing with this question in the untroubled days before the world war, the matter of finance would be a relatively easy one and we would not be so much concerned with ways and means. But it is necessary to remember that today the nation is carrying a heavy tax budget, and, what is more important, that the state and county levies are at higher levels than they have been in the past. Accordingly, we must weigh well all the elements entering into any appropriation for any purpose, and only those must be made which we know will surely return a direct profit to the public. Further, we must seek definitely to allocate those profits so that the burden will be borne in as large a measure as possible by those who are the beneficiaries.

Broadly speaking, we will all agree that those who are alive today and those who come after them down to the children of the third and fourth generations, will benfit from highway construction, provided that, once constructed, the highway is maintained. Some might go further and say that the highway, if maintained, will be of benefit for all time, but looking at this as practical men, we can concern ourselves only with a definite period of time wherein the inventive genius of the country would not have opportunity to upset our present scheme of transportation by new methods. This might well be from fifty to one hundred years.

It would then appear as a general proposition, assuming the ability of our engineers to maintain a highway once built, that the cost of highway construction should first be divided between this generation and those to come, which, of course, at once implies long-term highway bond issues. Here again, however, we come at once to practical limitations, the extent of which must be finally determined by economic research. Can the highway engineer maintain the road once built?

We have been accustomed to hear that roads have broken down under heavy motor traffic and that money expended for them has been wasted. Is this true? Fortunately, in this field we appear to be arriving at a definite demonstration of facts. Engineers tell us, for example, that 40 to 50 per cent. of the cost of construction of a highway is permanent, assuming that the highway has been properly located. The right of way, the grade, the drainage, bridges, shoulders and engineering costs need only be paid for once. It is the surface which wears.

Engineering records show that here the loss is less than is popularly supposed, since in the rebuilding of a surface it is possible to salvage much of the material and use it for a base for new surfacing.

This leaves us with a definite need for constant maintenance and that maintenance is limited not by physical but by financial ability. We have placed too much stress upon the original construction and not enough upon the constant maintenance.

Can we assume proper location of the highway? Here again is a field for the student of political administration in its relation to economics. The state engineer, looking at a map which shows the economic development of a state, the routes of through travel, and the feeder lines, has before him a bird's-eye picture which enables him to determine positively and accurately where highways should go. We can not expect the local official to be able to gage this so well. Centralization of authority seems essential if the public's funds are to be properly conserved.

Should we seek to develop all highway construction through bond issues? This question is one which can not be fully answered until those preceding it are taken into account. Before we expend any funds we must know that the benefits to be derived from the improvements of a highway are more than sufficient to justify the cost of that improvement. We must then be sure when bond issues are proposed that the improvement promises something more than the cost of maintenance. Before granting the authority to issue bonds, provision must be made for the proper control of construction expenditures, adequate maintenance and sinking funds.

THESE points checked off, we are likely to find that we have come down to a consideration of the improvement of the main state systems, which will average about 7 per cent. of the total mileage of this country. When completed, this system will place us all on main roads, or but a few miles away, and through the feeder lines we will be enabled to reach the great highway and deliver our commodities to market.

Here, then, is the field in which the cost of highway construction should be divided between this generation and those to come. Ye are proposing that this generation shall undertake to build these roads, charge the cost to capital account, pay for them by long-term bonds, use them and pass them on to the next generation in as good or better condition than when we built them. We propose that each generation shall pay a fair rental charge for the use of these roads in the sum of amortization charges, and interest, plus maintenance.

Shall we not then proceed as would a

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business man, or a farmer, when setting up his establishment? The full cost of the factory or the farm would not be assessed against the first year's income, but would be carried over a term of years, during which time the returns would be enough to meet all charges and pay a profit. This must not be taken to mean, however, that we should at once proceed arbitrarily to say to every state: "You must have a bond issue to take care of your road improvement program." As in all other phases of this complex problem, there are a host of limitations to be set up, and it is only through investigations by trained men and we shall ultimately find the correct answer. Dogmatic statements must be avoided. Prejudice must be eliminated.

Analyses of highway development to date show that there are two general sets of conditions which apply. The first is found in those states which, like New York, Massachusetts, and some of the other eastern and perhaps middle western sections, have to deal with a developed traffic problem and have already met with many of the conditions mentioned. The other condition is that of the southern or western states, where valuations are low, mileage is high and traffic not yet developed. Here the problem is one of construction, largely. The general tax burden is high, and any attempt to meet the needs of highway development from current funds would result in so retarding the program that dollars would be lost in diminished or retarded economic development where pennies would be saved.

The question which here must be answered is: "Do the increased profits resulting from highway construction under bond issues offset the difference in cost as between pay-as-you-use and pay-as-you-go methods of financing?"

LOOKING at this from the viewpoint of the business man suggesting clues to be run down. I want to state at the outset, that, if you consider this problem from the standpoint of building, let us say 100 miles on a pay-as-you-go policy in ten years' time as aginst 100 miles in one year with a bond issue, in the first case, in ten years you will have paid all of the principal charges of that 100-mile construction, but will have obtained only an average use of 50 miles for the entire ten-year period, while 100 miles built in one year give the use of the entire mileage.

This immediately suggests again the question of the benefit to be derived. In either case it must be assumed that there is to be a benefit, or the program should not be undertaken. The difference, then, is the interest charged. Against that there is the 10-year use of the 100 miles, and engineering investigations now under way indicate that the difference in operating costs of transport alone over the good road as against the bad would be sufficient to defray the interest charges many times over, even if we discarded the social benefits which inure.

Thus far we have discussed as beneficiaries only two general classes: this generation and those that follow. If the highway bond issue plan is to be carried out, however, we must set up the conditions under which these bonds will be issued, and in order to do so we should determine more specifically the question of beneficiaries in order that, in setting up our source of revenue, we shall be as equitable as possible.

At once a new set of questions presents itself for examination. What is the effect of highway improvement upon agricultural valuations? What is the effect of highway improvement upon urban valuations? What is the effect of highway improvement upon the operating costs of the user, the agent of the public? The answers will vary according to the topographical conditions, the economic conditions, the extent and character of the traffic. Each state will have to meet this situation as its own needs demand, and these needs can only be finally determined by specific inquiry and investigation upon a very broad scale.

There are few today, however, who will deny the influence of highway development upon the farmer. The truck gardener, the dairy products man, and even the producer of heavy staples, has found his markets favorably affected by highway improvement. Perhaps more important, the educational and social advantages derived from highway extension have opened a new vista to all.

Likewise, the development of urban properties, and particularly of suburban properties, has been perceptibly affected. No one who drives a motor vehicle or a horse will question the beneficial effect of highway improvements.

How far the use of large units made possible by road improvement has affected the economics of all three groups mentioned, is a point which few can discuss fully yet, particularly with regard to road improvement costs, but here again there is a definite problem to be worked out. So that, while the relative amounts may differ, it seems that any fair plan for construction should be based upon general taxes for construction purposes, since all classes are enumerated in the three broad divisions mentioned.

When maintenance is considered, however, a different answer presents itself. The damage to the wearing surface is done by traffic. Traffic benefits first by maintenance in lowered operating costs, so traffic should be expected to meet this levy. Yet at once the question arises as to what is maintenance? Shall we say that a manufacturer building a new plant or installing new machinery to take care of increased business should consider that an item of current expense? Could the farmer or business man who attempted to assess such costs against his crop or output in a single year, expect the buyer to pay it cheerfully? Likewise would the extension of a highway or its widening be an item in maintenance or construction? There seems to be a close parallel in these two instances, and undoubtedly where cases of this kind occur, ordinary business practice will prevail. The same problem presents itself when a road is lifted from a low to a higher type to the extent of the difference in cost.

Another consideration which must be made a matter for thorough study is found in regulation of traffic on the highways. The whole question of finance is tied up in this point, because, after all, the only justification for any highway improvement, as I have already noted, is the service should be permitted to grow without restraint as long as it is sound economically. If we restrict traffic unwisely, maintenance costs may be less, but transport operating costs may be swelled out of all proportion, and since the public pays the bill in any case, we should seek to make highway transport in its entirety function at the lowest possible cost.

HERE we can suggest a prolific field for investigation. Overloading apparently damages both road and vehicle. Seasonal limitations appear to be necessary under certain conditions, and still with a railroad congestion such as obtains today, which is of the greater public moment—the maintenance of a low grade highway surface, or its destruction by goods which must be moved? There should be definite restrictions on maximum loads, of course, at least until the highway builder can catch up with the highway user—a goal still far in the future—but it is not necessary to consider that phase in detail now.

I only wish to point out that unwise regulation, just as abuse of the road by the user, may operate to the detriment of the public interest, and therefore both should be carefully guarded against, particularly where we are concerned with the general aspects of a broad financial program predicated upon the need for traffic development.

California's Oil-Field Road

With the concreting of the Fellows-McKittrick road in 1920 the first adequately paved link in the proposed California oil-fields motor truck highway was completed. This section, 10¾ miles in length, will beyond doubt have great influence in hastening the improvement of additional portions of the route.

Oil production is today California's greatest industry. A heavy-duty highway joining the producing centers in Fresno, Kern and Ventura Counties would facilitate the transportation of the machinery and supplies necessary for the development of this important industry. With the paved roads that already radiate from Los Angeles and touch practically all oil-field developments in southern California, the construction of the proposed highway would complete the net-work of pavements and shorten the distance between many of the producing centers. The oil-fields highway would connect Coalinga, in the southern part of Fresno County, with Ventura, on the Pacific Ocean, where the road would intersect the coast route of the state highway system and make connections with Los Angeles and Santa Barabra. It would pass through Devil's Den, Lost Hills, Belridge, Reward, McKittrick, Fellows, Taft, Maricopa and Matilija.

Stone Stages Motor Hippodrome

Fred Stone, noted comedian, introduced a society circus novelty recently, by mounting the acts on eight motor trucks, each truck taking its turn before the grandstands. The affair was a benefit given at Mineola, New York, for the Occupational Therapy Society.

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Coming Events

Dec. 6 to 8, 1922.—Toledo, O. Sixth annual convention, Ohio Automotive Trades Assn. LaSalle-Koch assembly rooms. E. J. Shover, manager, 404 Central National Bank Bldg., Toledo.

Jan. 6 to 13, 1923.—New York City. Annual automobile show of National Automobile Chamber of Commerce, Grand Central Palace. Cars and accessories. S. A. Miles, manager, 46th St. and Madison Av., New York.

Jan. 8 to 13, 1923.—New York City. Second annual body-builders' show, auspices of Automobile Body-Builders' Assn. 12th Regiment Armory.

Jan. 13 to 22, 1923.—Oakland, Calif. Fifth annual show of Motor Car Dealers' Division of Alameda County Auto Trade Assn. Civic Auditorium. Trucks, cars, tractors and accessories. Robert W. Martland, manager, 407 Pacific Bldg., Oakland.

Jan. 13 to 24, 1923.—Brussels, Belgium. Sixteenth annual Automobile and Cycle Exposition. Palais de la Cinquantenaire.

Jan. 15, 1923.—Topeka, Kans. Convention of Automobile Trades Assn. of Kansas Philip E. Zimmerman, Topeka.

Jan. 15 to 19, 1923.—Chicago. Fourteenth National Good Roads Show, American Road Builders' Assn. Coliseum.

Jan. 27 to Feb. 3, 1923.—Chicago. Annual automobile show of National Automobile Chamber of Commerce. Coliseum and First Regiment Armory. Cars and accessories. S. A. Miles, manager, 46th St. and Madison Av., New York City.

Feb. 8 to 10, 1923.—Charlotte, N. C. Annual automobile show of Charlotte Automotive Trade Assn. Carolinas Exposition Bldg. Trucks, cars and accessories.

Feb., 1923.—Salt Lake City. Annual meeting of Intermountain Automotive Trades Assn. Carl L. Snow, manager, Salt Lake City.

Feb. 3 to 10, 1923.—Minneapolis. Sixteenth annual automobile show, auspices of Minneapolis Automobile Trade Assn. Trucks, cars, tractors and accessories. W. R. Wilmot, manager, 709 Andrus Bldg., Minneapolis.

Feb. 3 to 10, 1923.—Troy, N. Y. Ninth annual automobile show, Troy Used Car Sales Corp. New York State Armory. Trucks, cars, tractors and accessories. Frank M. Baucus, manager, 155 River St.

Feb. 12 to 19, 1923.—Portland, Ore. Fourteenth annual show of Automobile Dealers' Assn. of Portland. Municipal Audtiorium. Trucks, cars, tractors and accessories. Ralph J. Staehli, 424 Henry Bldg., Portland.

Feb. 16 to 26, 1923.—San Bernardino, Cal. Motor vehicle exhibit, National Orange Show. Tent. Trucks, cars, tractors and accessories. R. H. Mack, manager, 215 Chamber of Commerce Bldg.

Feb. 17 to 24, 1923.—San Francisco. Seventh annual automobile show, San Francisco Motor Car Dealers' Assn. Exposition Auditorium. Trucks, cars, tractors and accessories. G. A. Wahlgreen, 215 Humboldt Bank Bldg.

Feb. 17 to 24, 1923.—St. Louis, Mo. Sixteenth annual show, auspices of St. Louis Automobile Dealers' Assn. Trucks, cars and accessories. Robert E. Lee, manager, 1324 Locust St., St. Louis.

Feb. 17 to 24, 1923.—Akron, O. Ninth annual show of Akron Automobile Exhibition Co. Central Garage. Trucks, cars, tractors and accessories. E T. Jones, manager, 1091 W. Exchange Av., Akron.

Feb. 26 to Mar. 3, 1923.—Syracuse, N. Y. Fifteenth annual show. State Armory. Trucks, cars and accessories. Howard H. Smith, manager, 701 Eckel Bldg., Syracuse.

Mar. 3, 1923.—Quincy, Ill. Fourth annual convention of Illinois Automotive Trade Assn. F. C. Zilman, manager, 212 Lehlmann Bldg., Peoria, Ill.

Mar. 10 to 17, 1923.—Boston. Annual show, auspices Boston Automobile Dealers' Assn. Merchants' Bldg. Trucks, cars and accessories. Chester I. Campbell, manager.

Mar. 10 to 17, 1923.—Newark, N. J. Annual automobile show, Newark Auto Trade Assn. Claude E. Holgate, manager.

Gargett Joins Indiana

Recently F. W. Gargett joined the Indiana Truck Corporation in the capacity of assistant to the president, and his duties will be looking after the branches and the subsidiaries of the company. Mr. Gargett was formerly with the Transport Truck Company in the capacity of factory manager. He has had considerable motor truck experience during the past ten years.

September Gas Consumption Dropped 13% Below August's

EXCEEDED SEPTEMBER 1921 by 16%

The consumption of gasolene in the United States in September amounted to 507,934,527 gallons, a decrease of 75,000,000 gallons, or 12.98 per cent., from the figures for August, in which month a high record mark for domestic consumption of gasolene was attained, states the Bureau of Mines. Consumption of gasolene in September was, however, approximately 16 per cent. greater than in September of last year.

The production of gasolene in September amounted to 536,491,988 gallons, which is a decrease of 2.45 per cent. from the August output, but an increase of 28.68 per cent. over the figures for September, 1921. Exports of gasolene for the month were 44,833,609 gallons; imports were 4,563,315 gallons; and shipments to insular possessions amount to 1,974,668 gallons. Stocks of gasolene on hand October 1 were 690,050,809 gallons, a decrease of 13,700,000 gallons during the month.

Production of kerosene in September amounted to 197,935,102 gallons, an increase of approximately 13,500,000 gallons, or 7.35 per cent., over the August output and about 44,000,000 gallons, or 28.51 per cent., above the figure for September, 1921. Stocks of kerosene October 1 were 270,576,864 gallons, a decrease of 15,000,000 gallons for the month. Kerosene exports and shipments to insular possessions in September amounted to 72,114,973 gallons.

The output of gas and fuel oils in September amounted to 917,857,786 gallons, which is 27,000,000 gallons, or 2.8 per cent., below the August production, but about 129,000,000 gallons above the figure for September of last year. Exports of gas and fuel oils and shipments to insular possessions in September were 74,823,025 gallons. Bunker oil laden on vessels engaged in foreign trade amounted to 117,458,082 gallons. Stocks on hand October 1 were 1,364,957,165 gallons, a decrease of only 1,654,446 gallons during the month. Gas and fuel oil stocks were 135,000,000 gallons above the figure for September, 1921.

Production of lubricating oils in September amounted to 82,056,712 gallons, a decrease of 6,775,000 gallons, or 7.62 per cent., from the August output, but an increase of 18.83 per cent. over the output for September, 1921. Exports and shipments to insular possessions during the month totaled 28,136,445 gallons. Stocks of lubricating oils October 1 were 214,727,811 gallons, a decrease of 6,000,000 gallons during the month and of 15,500,000 gallons compared with figures for September a year ago.

Columbia University in its Extension Department has started a course in automobile engineering, aiming to give the owner a working knowledge of the internal-combustion engine. Frederick H. Dutcher of the School of Engineering will conduct the course.

"Railways Must Study 'Buses"

Second only in importance to the upbuilding and restoration of street-railway credit is "the study of trackless transportation, particularly 'buses and automobiles in their relation to electric railways," said President C. D. Emmons of the American Electric Railway Association. "Of particular interest to the financial problem, and also relating directly to the question of trackless transportation, is the need of certificates of convenience and necessity from regulatory bodies for additions to present transportation facilities," he added. "The ultimate best transportation service must be in the unification of all local transportation under one agency, and this fact should be brought home to the citizens of every community or district availing themselves of the existing street-railway company providing all such local transportation. Certainly, in the natural order of things, the street-railway company should be in the position to furnish the most efficient coördinated service and to operate it with trained executives and skilled personnel. Under such conditions, better service should be rendered to the citizens than where new agencies are allowed to come in and to develop organizations at the expense of the traveling public, while, at the same time, undermining the credit and reducing the possibilities of efficient service by existing systems of transportation. Do not the words of Messrs. Brush, Wickwire and Chairman Jackson, at the Convention just past, make us "sit up and take notice," especially the words of Chairman Jackson, who said in part:

" 'The situation demands general power in regulatory bodies to prevent competition of jitneys and 'buses with essential street car service . . . . This is not saying that there may not be and is not a proper field for motor 'buses. Recent developments indicate that they may have a very proper place in the scheme of urban street-railway transportation as feeders to existing lines and as a means of serving thinly settled territory where the traffic does not warrant the extension of the railway system, but where the general welfare of the city requires that the residents of this section be furnished with some satisfactory means of transportation. Feeder service of this nature should be furnished by the railways themselves in connection with their transportation system and coördinated with it.' Where necessary our companies should appeal to public utility commissions and state legislatures for fair play in the regulation of motor 'buses in competition with our electric cars."

Announcement is made of further details of the merchandising plan under the sales policies of the new Bethelem Motors Corporation of New York, Allentown, Pennsylvania, manufacturer of Bethlehem trucks. Distributers and dealers of the new Bethlehem product are being appointed by resident managers in ten districts covering the United States. Each resident manager is a man of wide experience in the motor truck industry, and gives truck distributers and dealers personal contact with the factory in their respective territories. All contracts drawn are on the perpetual basis.

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New York Compares Costs of Highway Maintenance

CONCRETE SHOWS LOWEST UP-KEEP

In the recently published annual report of the state commissioner of highways of New York, for the year 1921 there appears a table of maintenance costs which probably offers the most comprehensive data on this important subject ever presented for a single state. The following textual excerpts and tables are quoted from the report of the Second Deputy Commissioner H. G. Hotchkiss, Jr.

Submitted herewith will be found a table (Table I.) giving the maintenance cost per mile per year for the various types of improved roads in the state. The last column gives the cost per mile of expenditures on the paved portion only. The fourth column gives the cost per mile for all work, but does not include reconstruction costs when a type is changed. The third column gives the same, except that the cost of replacing the old road by a new type is included and charged against the old type. This column is merely for general information. The last two columns of this table on types which have a length of 25 miles or more are very valuable. The rest should be used with caution, as its chief value is in making a cumulative record rather than in the record for any one year.

Table II. gives the average cost per mile for maintaining the eight types of greatest mileage for the past seven years and covers a mileage varying from 5,400 to 8,000 miles for the various years. All overhead and general expenses of every nature have been prorated in proportion to the money spent on each type. The table does not include reconstruction costs, but it is the best information available in this country on the important subject of state and county highway maintenance cost. It may be taken with confidence as the average cost of keeping these types in the average condition found on New York state and county highways.

More motor trucks are used on the farms in the West North Central States than in any other section of the country, according to U. S. Bureau of the Census figures. Minnesota, the Dakotas, Iowa, Missouri, Kansas and Nebraska have 33,000 trucks on farms.

TABLE I.—COST OF MAINTENANCE OF VARIOUS TYPES OF ROADS, 1921.

Type of Pavement.	Miles Maintained. Including Change to More Durable Type.	Miles Maintained. Excluding Change to More Durable Type.	Cost per Mile—Including Change to More Durable Type.	Cost per Mile—Excluding Change to More Durable Type.	Pavement Only excluding Change to More Durable Type.
Bituminous macadam penetration method, macadam base, asphalt binder	3,201.87	3,186.82	$1,033	$ 770	$ 581
Tar binder	255.06	255.03	543	540	341
Concrete base, asphalt binder	45.21	45.21	560	560	446
Tar binder	16.81	16.81	363	363	250
Waterbound macadam	2,599.04	2,536.29	2,007	951	813
First class concrete, 1:2:4 mix or richer	730.45	730.45	225	225	81
Second class concrete, 1:2½:5 mix or leaner	187.65	181.50	1,957	874	710
Hassam concrete	49.03	49.03	679	679	395
Brick pavement	280.45	280.19	352	307	226
Gravel	141.14	136.30	1,861	890	767
Bituminous macadam mixed method:					
Topeka concrete base	65.42	65.01	831	299	128
Topeka macadam base	29.72	29.72	769	769	354
Amiesite concrete base	6.25	6.25	440	440	215
Amiesite macadam base	4.88	4.88	53	53	10
Open mixed concrete base	17.09	17.09	413	413	166
Open mixed macadam base	15.43	14.68	3,869	462	288
Bitulithic concrete base	15.12	15.12	244	244	231
Warrenite-Bitulithic	1.81	1.81	...	.....	...
Willite, concrete base	1.66	1.66	...	...	...
Bitoslag, concrete base	2.31	2.31	37	37	...
Sheet asphalt, concrete base	.61	.61	229	229	229
Gravel mixed, gravel base	8.38	7.72	5,154	1,978	1,757
Henderson, macadam base	0.51	0.51	...	...	...
Block pavements:					
Asphalt, concrete base	18.34	18.34	347	347	214
Asphalt, macadam base	1.73	1.73	1,271	1,271	1,082
Wood	0.26	0.26	...	...	...
Stone	3.58	3.58	9	9	...
Brick cubes, macadam base	0.32	0.32	104	104	104
Bituminous sub-base	15.70	15.70	332	332	266
Bituminous macadam, three layer method	7.29	7.29	734	734	448
Kentucky rock asphalt	17.55	17.55	686	686	614
Rocmac	0.15	0.15	...	...	...
Three-strip dual	6.81	6.81	134	134	120
Two-strip dual	33.99	31.69	1,562	332	146
Total	7,781.62	7,688.42	...	...	...
Average cost per mile	.....	.....	$1.280	$744	$582

TABLE II.—AVERAGE ANNUAL MAINTENANCE COST PER MILE OF PRINCIPAL TYPES OF ROADS, INCLUDING CHANGE OF TYPE.

	1915.	1916.	1917.	1918.	1919.	1920.	1921.	Average.
Bituminous macadam, penetration method, asphalt and tar	$ 510	$ 483	$ 408	$ 557	$ 501	$ 590	$ 753	$ 543
Topeka on concrete base	.....	205	245	435	144	335	299	277
Topeka on macadam base	.....	256	393	1,056	443	985	769	650
Waterbound macadam	1,055	906	970	739	694	797	951	873
Brick	190	176	222	251	247	242	307	234
First-class concrete	129	141	112	160	214	227	225	173
Second-class concrete	1,050	1,080	1,127	791	761	868	874	936
Gravel	955	587	918	909	771	704	890	819
Average, all types	$750	$651	$643	$608	$560	$631	$744	...

Hinkley Adopts Novel Plan for Keeping Trucks in Use

RAPID ENGINE REPLACEMENT POSSIBLE

A radical and progressive step in truck unit merchandising has been taken by Hinkley Motors, of Ecorse, Michigan, which, while continuing to serve truck manufacturers as a source of engine supply, is also selling Hinkley engines, which are its sole product, direct to fleet owners and individual truckmen on a replacement basis.

The Hinkley plan is a development of several months of experiment, during which time its various details have been thoroughly tested and an organization formed which is now placing distributers in the trucking centers of the country. Part of the plan is a system of motor support with dimensions so flexible as to permit a Hinkley installation to be easily made in any truck of the front-radiator type, regardless of the depth or width of frame.

"Our plan is based on the radical fallacy which sets aside as worn out a truck, every part of which is thoroughly serviceable except the engine," declared Mr. Hinkley, in discussing his company's new policy. "As a matter of fact, any good, heavy-duty truck should wear out at least three engines—in many cases four. And it should give fully as good satisfaction with each of the replacements as with the original engine. Such units as transmission, axles, frames, wheels, and cab are virtually indestructible in such a vehicle, and encounter no strains or speeds comparable to those of the truck's engine. Replacement of an engine is just as logical as that of a tire.

"Another problem which our plan solves for the truck operator," continued Mr. Hinkley, "is the uncertain cost of major engine overhaul. We undertake this ourselves for all owners of Hinkley-engine trucks, shipping each replacement engine when his first Hinkley is ready for the shop. The truck owner is thus able to eliminate virtually all time loss, slipping his replacement engine into place in a few hours. We have put engine overhaul on a production basis and have greatly reduced the cost of that operation, at the same time materially increasing the efficiency of the job. We accept any used Hinkley in need of overhaul as part payment for a rebuilt engine.

"Truck owners all over the country have been prompt in the support of this plan. More than one big fleet owner has assured us that our offer has stopped him from discarding many or all of his motor trucks and going back to horse delivery."

The addition of the replacement plan is also welcomed, Mr. Hinkley says, by the truck manufacturers using Hinkley engines as standard equipment. Seventeen such manufacturers are listed. Replacement plan distributers, already placed, are announced by Sales Manager Charles A. Neville of the Hinkley forces, as follows: Buffalo, Standard Welding & Manufacturing Company, 1156 Main street; New York City, Gorey Automotive Parts Company, 354 West 50th

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How Good Paved Roads Can Pay for Themselves

By FRED R. WHITE

Chief Engineer, Iowa State Highway Commission

MANY people feel that we can not afford to surface our roads, and especially that we can not afford to pave. A careful study of the case leads one to wonder how long we can afford to not pave the main arteries of travel. We all know that a vehicle rolls easier on the ordinary gravel surface than on the ordinary earth surface. When coming off a dirt or gravel road on to a paved road, a driver unconsciously gives the engine less full and yet his speedometer says that the speed of the vehicle has increased 5 to 10 miles an hour. This means less gasolene consumed, less wear on the car, and greater comfort for the operator.

For the past three years the College at Ames, in coöperation with the highway commission, has carried on a series of experiments to determine the tractive resistance and the fuel consumed per unit of traffic, on various road surfaces. Fuel consumption runs have been made on several hundred miles of each type of highway surface. The results of these tests, with the effect of grades eliminated, indicate that on an earth road we get 14 ton-miles per gallon of gasolene, on a gravel road we get 21 ton-miles per gallon, and on a concrete pavement we get 31 ton-miles per gallon. With gasolene costing 24 cents per gallon, the fuel costs 1.71 cent per ton-mile on an earth road, 1.15 cent per ton-mile on a gravel road, and 0.77 cent per ton-mile on a concrete pavement.

With these figures at hand and knowing the number of the various types of vehicles passing over a given road in a given space of time, we are in a position to make some rational determination as to when we can afford to pave or gravel that particular road. In 1917 and 1918 the Good Roads Experiment Station of the college established weighing stations in various parts of the state, at which points the actual weight of the various types of vehicles using the highway was determined. These data show that the average weight of a horse-drawn passenger vehicle is 671 pounds, of a horse-drawn freight vehicle 1,998 pounds, of passenger automobiles 2,691 pounds, and of motor-driven freight vehicles 3,720 pounds. Since that time the average weight of different types of motor vehicles has probably increased somewhat, but if so, the figures are on the conservative side. Applying these weights to the various types of vehicles using a given road shows the average daily tonnage of traffic, and applying to this tonnage the cost of gasolene consumed per ton-mile on that particular kind of surface gives data from which we can determine whether it is economical to gravel or to pave that particular road.

The commission has a traffic counting party on the roads, making a record of the traffic in certain locations. One of these counting stations was located on the Lincoln Highway just east of Ames. At that point there was an average daily traffic of 904 vehicles. These vehicles were so divided between the light and heavy types that the average daily traffic amountd to 1,232 tons. This is at present a gravel road, and since our data show that at present it costs 1.15 cent per ton-mile for fuel on a gravel road, and 0.77 cent per ton-mile for fuel on a concrete road, then, if this road were to be paved, it would be possible to save 0.38 cent per ton-mile in the fuel consumed. This saving, applied to the 1,232 tons of average daily traffic, gives an average daily saving of $4.78 per mile of road. This amounts to $1,746 per mile per year. The average cost of maintaining the Story County gravel roads on the primary road system in 1921 was $803 per mile. There is no paving on the primary roads of Story County. In 1921 the average cost of maintaining pavements on the primary roads was $89 per mile. Accordingly, the saving in the cost of maintenance as between the average mile of Story County gravel road and the average mile of pavement, was $714. This amount, added to the $1,746 per mile saved in fuel consumed would make a total of $2,460 per mile per year.

Contracts have been let this year for approximately 125 miles of paving. The average price is $26,400 per mile for a pavement 18 feet wide. The interest on this investment at 5 per cent. would amount to $1,320 per mile for the first pear, but by paying for a portion of the road each year, the average interest would be only one-half of the total interest for the first year, or $660. Deducting this amount from the $2,460 saving per mile per year, leaves an average of $1,800 per mile per year for the payment of the cost of the road. This sum would completely pay for the paving in 15 years.

Another counting station was located on the primary road north of Spencer. The count showed an average daily traffic of 1,272 vehicles, or 1,698 tons. This also is a gravel road. Applying the saving of 0.38 cent per ton-mile in the fuel consumed, as between the gravel road and the paved road, shows a saving of $6.45 per day per mile, or $2,354 per mile per year. The average cost per mile for maintaining gravel roads on the primary system in Clay County in 1921 was $654. Since the cost of maintaining the average mile of concrete paving was $89, the maintenance on the gravel was $565 per mile in excess of the paving. Adding to the saving the $565 difference between the cost of maintaining a gravel road and the cost of maintaining a paved road, makes a total saving of $2,919 per mile per year, that would result from the paving of this road. Deducting the average interest rate of $660 leaves $2,259, average per year that could be applied to the payment of the cost of the paving. This payment would be sufficient to completely pay for a paved road in this location in 10 years.

The third station was located north of Sioux City on the Sioux City-Le Mars road. The average daily traffic was 709 vehicles. The average daily tonnage was 978. This is an earth road. Since the fuel consumed on a paved road is 0.94 cent per ton-mile less than on an earth road, the saving per mile by paving this road would be $9.19 per day or $3,354 per year. Last year it cost $297 per mile to maintain the dirt roads, as against $89 per mile for the paved roads. There would be a saving of $208 per mile per year in maintenance costs. Adding this sum to the saving of $3,354 per mile in fuel consumed, makes a total saving of $3,562 per mile per year that can be made by the paving of this highway. Deducting the $660 for annual average interest, leaves $2,902 per year to be applied to the retirement of the principal. This would be sufficient to completely pay for a paved road in this location in 9 years.

Another station was located on the paved road just north of Des Moines. The average daily traffic was 2,173 vehicles, which amounts to 2,964 tons. This road was formerly surfaced with cinders. Assuming the fuel consumed on a cinder road to be practically the same as gravel (certainly it would not be less) than by the paving of this road there was saved to its users $11.26 per day, or $4,110 per mile per year. Adding $361 per mile which is the difference in the cost of maintenance in 1921 between the average mile of paving and the average mile of gravel road on the primary road system, makes a total annual saving of $4,470 per mile. This road is 20 feet wide. It was constructed in 1920, right at the peak of prices. It cost approximately $48,400 per mile. The interest on this investment at 5 per cent. will average $1,210 per year. Deducting this $1,210 from the total annual saving of $4,470, leaves $3,260 to retire the capital investment. This sum is sufficient to completely pay for this road in 15 years. At present prices this road would have cost approximately $29,300 per mile. The average annual interest on the investment would be $737 per mile, leaving $3,733 per mile to retire the capital investment. This is sufficient to completely pay for the road in a period of 8 years.

The primary road law requires that bonds issued for paving work shall be paid off in 15 years. In each of the above examples the savings in fuel and maintenance due to the paving of the road would pay all interest charges, and pay off all the cost of the paved road within the 15-year period.

In general, it may be stated that whenever the traffic on a dirt road exceeds 110 tons per day, the saving on the cost of the fuel will pay the annual interest and retire the first cost of a gravel surface in a period of 10 years, and that when traffic on a dirt road exceeds 610 tons per day or whenever the traffic on a gravel road exceeds 1,450 tons per day, that the saving in the maintenance cost and the saving in the fuel cost will pay the annual interest and in 15 years retire the principal required to construct a pavement on such highway.

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street; Pittsburgh, Parts Engineering Company, 3371 Bigelow boulevard; Detroit, MacEvan & Shapley, 3169 East Jefferson street.

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We are now paying for paved roads in this state and are not getting the roads. We are paying a premium for the privilege of using a dirt road. We have approximately 500,000 motor vehicles. If annually we get 4,000 ton-miles of traffic from each of these vehicles (and this seems to be a very modest estimate) then we have approximately 2,000,000,000 ton-miles of traffic each year on our roads. Probably 80 per cent. of this traffic, or 1,600,000,000 ton-miles annually, is carried on the primary roads. The saving in the gasolene consumed on a paved road over that of a dirt road is approximately 1 cent per ton per mile. If our primary roads were paved, the saving to the road user in fuel alone, would amount to $16,000,000 annually. This sum, together with the primary road funds which we now have, would produce a revenue sufficient to build 800 miles of pavement a year, and would complete the paving of the primary road system in 8 years. This is as rapidly as work can reasonably be done. In other words, if we would put into the surfacing of the road the sums which we now annually expend for increased gasolene in driving over earth roads, we would complete the paving of the primary road system as rapidly as work could be done.

These savings in fuel seem large; so large in fact, that one may be pardoned if he questions their accuracy, yet the data have been developed after some three years of the most painstaking scientific investigation of the question of tractive resistances on different highway surfaces. The results are corroborated by A. W. Campbell, Commissioner of Highways for the Dominion of Canada, who, in a recent article, says:

"Results of a series of experiments with average conditions conducted by a reliable authority, to determine resistance to automotive traction, using a light commercial motor vehicle over different types of "improved" roads, and the resultant consumption of gasolene, at average rates of speed, are summarized as follows:

Type of Road.	Pounds Pull Per Ton Load.	Miles Per Hour.	Miles Per Canadian Gallon.
Improved earth	90 to 218	4.6	6.93
Improved gravel	78 to 81	9.5	8.62
Waterbound macadam	64	...	11.38
Paved surface ..	27.6	16.4	13.90

"It will be observed that the excess of mileage made per gallon of gasolene is considerable for each type of improved road over that made over the lower type. Twice the distance was made for the same amount of gasolene used, in traveling over the paved surface as in traveling over the improved earth road. In other words, the saving of gasolene as between these two types of roads is approximately 50 per cent.

"Should all the main traveled roads of the Dominion be given hard surfaces, the annual saving to the 460,000-odd registered owners of motor vehicles in Canada, assuming that all users would participate in the benefits of the improvements, based upon the above conservative estimate, and having no regard to savings from lubrication and repair, expenses would amount to $23,000,000."

These savings are based on fuel alone. No account is taken of the numerous other savings that would accrue to the road user through the construction of an adequately surfaced system of roads. The wrecking of a car on a rough or slippery road, the wear and tear on tires, the chains worn out and broken, the loss of time, all those and many more items, go to make up the sum total of savings that would result. No account has been taken of these items, for the reason that, so far as I know, there is no definite way in which they may be evaluated.

Automobile men tell me that the average life of a car is five years. If this is true, then we must buy 100,000 new motor vehicles per year if we keep the total up to the present mark. These new machines will cost us probably $80,000,000 annually. If we can save one-fifth of this amount, if we can prolong the life of the vehicles only one year, the savings amount to $16,000,000 annually, which in itself would constitute a very sizable road fund.

We are approaching the problem from a rather difficult angle. In the case of a railroad the road-bed and rolling-stock are both owned by the same individuals or concern, and a division of the earnings, as between the roadbed and other expenses, is fairly easily accomplished. With our highways the case is different. The public owns the road-bed while the individuals own the rolling stock. A fair division of the earnings of highway transportation is not so easy.

I am one of those who believe that the cost of main thoroughfares such as our primary roads, should be paid for by the road user, without special assessments on adjacent property, and when we surface a road, thereby saving to the road user a considerable sum of money annually in the gasolene which he consumes, that we should in turn require him to pay into the public funds a measurable portion of the amount which we save. This would not be a tax. It would be a charge for service rendered. I submit as a fair statement that it is not a kindness to the road user to fail to collect from him a sufficient amount to improve the main thoroughfares in a manner commensurate with the traffic which they carry.

British Discounts to Fleet Owners

The question of proper discounts given by manufacturers to owners of motor trucks and whether these should be granted by the manufacturer direct or through the trade only has agitated the British motor industry for a long time. Some time ago the Motor Agents' Association, the recognized body of dealers, issued a questionnaire in an effort to sense the feeling of the trade on these points and as a result of the sentiment disclosed the tire manufacturers agreed with the association on a sale of discounts to be granted truck owners. An open letter to the trade by the B. F. Goodrich Company, condensed below, explains the attitude of that company and reflects in a general way the opinion of the more stable tire makers:

"In accordance with the wishes of the trade expressed in response to the M. A. A. questionnaire of August last, we have decided to adopt the new scale of discounts for commercial (motor) vehicles, as agreed upon at the meeting between tire manufacturers and the Motor Agents' Association on September 6. Our discounts on commercial (motor) vehicles for the coming year will, therefore, be as follows:

To owners of 1, 2, or 3 vehicles, 5 per cent. To owners of 4, 5, or 6 vehicles, 10 per cent. Goods carrying vehicles only.

"There remains the further question as to whether these discounts should be granted through the trade only, and on this point we are unable to identify ourselves with that part of the resolution which entitles tire manufacturers to quote and supply direct to the commercial (motor vehicle) user 'in districts where they are unable to obtain adequate trade representation.' In our view this is ambiguous and throws the door wide open to direct trading within the 6-vehicle limit, since any manufacturer has only to profess himself dissatisfied with trade support in any district to be free to approach the user direct. As there is no part of Great Britain where trade support can not be obtained, this clause is either meaningless or is the thin end of a wedge which, if driven home, would separate the trader from his rightful customer the commercial (motor vehicle) user. With such a principle we, the Goodrich Company, can not associate ourselves. We consider that the trader is entitled to a clear-cut understanding with the manufacturer—an absolute undertaking from the manufacturer—that the results of his spade work in the field of commercial transport shall be definitely secured to him. He is entitled to an assurance that, on any scale of controlled discounts, he will not be opposed or outquoted by the tire manufacturer in any circumstances whatever.

"This assurance we are prepared to give, and during the coming season our discounts of 5 per cent. on 3, and 10 per cent. on 6 vehicles will be quoted through the trade only. We shall open no direct accounts with commercial (motor vehicle) users up to the 6 vehicle limit.

"Now as to the trader's profit on his business. We stated twelve months ago that it should not fall below 15 per cent, and, being still of that opinion, we shall continue our present system of sharing with the trader the losss of profit on all commercial (motor vehicle) users' business accepted at 10 per cent. under list price. Thus, our standard trade discount is 20 per cent. from list. On commercial (motor vehicle) users' business accepted in accordance with standard conditions of supply at 10 per cent. discount (4 to 6 vehicles) it will be 25 per cent., exclusive of contract rebates, so that even non-contracting traders will be assured of a clear 15 per cent. profit and we shall not quote or supply this class of commercial (motor vehicle) user direct.

"In connection with this we have to offer our thanks to all traders who signed our commerical (motor vehicle) users' agreement and identified themselves with our policy during the past season. It is specially gratifying to us that no single complaint as to improper resale or any charge of irregular or unfair trading has been made, either officially or unofficially, against the company since our scheme was put into operation in January, 1921, neither have we had cause to complain of any abuse of our preferential discount. This justifies our repeated conviction that the trader can always be relied on to keep faith on any equitable proposition, and it is with the greatest pleasure that we place our experience on record."

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How the Railways Would Do It

By J. R. COMPTON

WITH the increasing use of motor vehicles in highway transportation service there has come a heavy increase in the cost of highway maintenance. Under present conditions in most states the public bears the burden of the construction and maintenance costs, and commercial motor transport companies and individuals engaged in highway transport enjoy a public subsidy, while rail lines are subjected to strict regulation and heavy taxation.

In such manner is the situation viewed and described by the electric railway men, who, under the pressure of competition from motor 'buses and trucks, are fighting for a general policy of state taxation of motor carriers. Such a situation is unfair to the public as well as to the railways, say they, and for a long time there has been discussion of a proposal that a uniform motor vehicle regulatory law be submitted to the various states. A special committee appointed last May to consider these conditions reported to the American Electric Railway Association convention in October, and its report was adopted. The committee states succinctly the situation in which the public finds itself and submits a proposed bill, which can be modified in minor details to meet conditions in the different states. The bill is not proposed as the final, definite measure, but it does voice the principle. The committee report is as follows:

Your committee was appointed on May 8, 1922, for the purpose of making a study of the motor 'bus and motor truck transportation industry and recommending a uniform regulatory law that might be useful in the various states in the formulation of fair and effective motor 'bus and motor truck regulation.

The committee held a preliminary meeting in Chicago on June 26, 1922, and agreed as to the fundamental elements of regulation, but found some difficulty in arriving at a decision on the proposed method of taxation of motor transportation companies. It was ascertained that no uniform method of taxing motor vehicle common carriers was in effect. The taxes assessed against these motor vehicle common carriers ran all the way practically from no special tax in some states to a very inadequate special tax in other states. The committee decided that this matter of taxation was one of first importance.

Manifestly, inadequate taxation for the use of public highways by motor vehicle common carriers results in a public subsidy for such carriers. The public can not consistently subsidize these motor vehicle common carriers, and the problem of taxation represents the correct method of assessing motor vehicle common carriers with such special tax as will compensate the public for the additional burden that these common carriers are to the public highways. From this viewpoint your committee determined that a ton-mile tax for all motor vehicle common carriers, which would as nearly as possible return to the highway funds an amount that would represent the actual deterioration of the highways caused by motor vehicle common carrier traffic, should be used. In principle, this plan of taxation would be exactly fair to all parties in interest so far as the maintenance of highways is concerned. The public would be relieved of the charge on its funds for repairing damaged highways due to motor vehicle common carrier traffic. The 'bus lines or truck lines would be required to pay only for the damage wrought and this amount would be assessed to the users of such transportation in the rates charged.

The rate for this special taxation was the next question. Through the coöperation of the special engineer of the association an attempt was made to obtain accurate data on the deterioration of public highways caused by ton-miles of motor vehicle travel. Quite extensive search was made without securing from any source absolutely accurate information. From the best studies that we could develop the figure of 1 cent per ton-mile for pneumatic tire vehicles and 1½ cent for hard tire vehicles were used. These figures were based on information secured in personal conference and extended correspondence with state highway commissions in various parts of the United States.

The committee determined to recommend in its proposed bill the figures set out herein with the admonition to all parties in interest that these figures are not the result of accurate data, but are the best figures available from the present state of experimentation on the subject of highway deterioration. Future studies designed to develop accurately this question of deterioration per ton-mile of travel may reveal the necessity of a revision in the figures recommended, but not, it is believed, downward. This, however, should not deter any law-making body from using the basic idea of ton-mile tax, because it is founded on the absolutely fair idea of compensating the public highways for damage caused and no more. In many states at the present time experiments are going on in the matter of highway building and maintenance, and in such states it would be wise to direct these experiments along the line of the additional information necessary to determine the deterioration caused various kinds of public highways by various kinds of motor vehicle travel per ton-mile.

Certain fundamentals in the proposed uniform motor vehicle regulatory law that is submitted with this report are so obvious they hardly need comment. For instance, in Section II of the proposed bill, jurisdiction to a state board is given over all motor vehicle common carrier traffic. This is as necessary in regulation motor vehicle transportation as it is necessary in the regulation of rail transportation.

Section IV of the proposed bill requires a certificate of necessity and convenience before a motor 'bus company can commence operation. This not only is a protection against indiscriminate and fly-by-night competition in the transportation industry, but it allows of the building up of transportaton service either by 'bus or by rail, under the direction of the state regulating board, which may not be disturbed by ruthless competition. In other words, unless there is a public necessity for the transportation line, either rail or motor vehicle, it is economic waste to install the same, and one motor vehicle line or one rail line giving reliable service is much better for the public than two or more transportation lines giving inadequate and unreliable service due to insufficient business.

Section VII of the proposed law requires liability insurance and protects the public from uncollectible damage due to financially irresponsible motor vehicle transportation lines. This is necessary inasmuch as the investment of these motor vehicle common carrier lines represents but a fractional part of an amount that might become due on account of some serious condition. This is not true of rail transportation companies, because the investment in the rail transportation industry is sufficient in itself to compensate an injured person for all damages he might sustain.

Section VIII of the proposed law confers upon the state regulating board the right to prescribe safety regulations. This is particularly important in that motor vehicle common carriers are operating on the public highways in common with all other vehicular traffic. They have no means of controlling the use of the highways by other vehicles, and therefore, must be subjected to such regulations as may be necessary for the public safety in their use of the public highways.

In conclusion, your committee believes that the adoption of laws in the various states similar to the one proposed will effectively equalize to a large extent the transportation conditions between motor vehicle common carriers and the railroad industry, as well as definitely secure the public from further payment of the enormous annual subsidy now going to these motor vehicle common carriers in the shape of uncompensated use of the public highways.

SPECIAL COMMITTEE,
C. D. CASS, Chairman,
C. D. EMMONS,
ARTHUR W. BRADY,
DAVID DALY,
PAUL SHOUP.

(NOTES: In this proposed law, in various states it may be necessary to change the name of the state board to whom jurisdiction is given. In some states it will be public utilities commission, in others it will be the state highway commission, in others the railroad commission, and the language must be made to fit the local conditions in the states using this bill as a sample.)

A BILL

FOR AN ACT PROVIDING FOR THE SUPERVISION, REGULATION AND CONDUCT OF THE TRANSPORTATION OF PERSONS, FREIGHT AND PROPERTY FOR COMPENSATION OVER THE PUBLIC HIGHWAYS OF THE STATE OF——— BY MOTOR VEHICLES; CONFERRING JURISDICTION UPON THE RAILROAD COMMISSION; PROVIDING FOR THE ENFORCEMENT OF THE PROVISIONS OF THIS ACT AND FOR THE PUNISHMENT FOR VIOLATIONS THEREOF; AND REPEALING ALL ACTS INCONSISTENT WITH THE PROVISIONS OF THIS ACT.

SECTION I. (a) The term "motor vehicle" when used in this act means any automo-

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bile, automobile truck, motor 'bus, or any other self-propelled vehicle not operated or driven upon fixed rails or track.

(b) The term "motor carrier" when used in this act means any person, firm or corporation, lessee, trustee or receiver, operating any motor vehicle with or without trailer or trailers attached, upon any public highway for the transportation of passengers or property for compensation between fixed termini or over a regular route even though there may be periodic or irregular departures from said termini or route.

(c) The term "public highway" when used in this act means every public street, road or highway, or thoroughfare of any kind in this state, used by the public, whether actually dedicated to the public and accepted by the proper authorities or otherwise.

SECTION II. The Railroad Commission of the State of ———— is hereby vested with power and authority, and it shall be its duty to supervise and regulate every motor carrier in this state; to fix or approve the maximum or minimum or maximum and minimum rates, fares, charges, classifications and rules and regulations pertaining thereto, of each motor carrier; to regulate and supervise the accounts, schedules, service and safety of operations of each such motor carrier; to prescribe a uniform system and classification of accounts to be used, which among other th ngs shall set up adequate depreciation charges, and after such accounting system shall have been promulgated, motor carriers shall use no other; to require the filing of annual and other reports and any other data; and to supervise and regulate motor carriers in all other matters affecting the relationship between such common carriers and the traveling and shipping public. The Railroad Commission shall have power and authority by general order or otherwise to prescribe rules and regulations applicable to any and all motor carriers. All control, power and authority over railroads and railroad companies now vested in the Railroad Commission is hereby specifically extended to include motor carriers.

SECTION III. All charges made by any motor carrier for any service rendered or to be rendered in the transportation of passengers or property, or in connection therewith, shall be just and reasonable and every unjust and unreasonable charge for such service or any part thereof is prohibited and declared unlawful.

SECTION IV. It is hereby declared unlawful for any motor carrier to operate or furnish service within this state without first having obtained from the Railroad Commission a certificate declaring that public convenience and necessity require such operation. The Railroad Commission shall have power, and it shall be its duty after public hearing, to issue said certificate as prayed for, or to refuse to issue the same, or to issue it for the partial exercise only of said privilege sought, and may attach to the exercise of the rights granted by such certificate such terms and conditions as in its judgment the public convenience and necessity may require. The Railroad Commission may at any time suspend, alter or amend any certificate issued, or after hearing for cause may revoke any such certificate. Motor carriers must operate and furnish service in strict conformity with the current existing terms and provisions of their respective certificates of convenience and necessity.

The Railroad Commission shall adopt rules prescribing the manner and form in which motor carriers shall apply for certificates required by this section. Among other rules adopted, there shall be rules as follows:

(a) Application shall be in writing.

(b) Shall contain full information concerning the financial condition and physical property of the applicant.

(c) The complete route over which the applicant desires to operate.

(d) The proposed schedule or schedules or time cards of the applicant.

SECTION V. No motor vehicle weighing more than ———— thousand pounds including its load shall be permitted to operate over the public highways of this state.

SECTION VI. In addition to the regular taxes imposed on motor vehicles in this state, every motor carrier shall pay the following taxes for the maintenance and upkeep of the public highways:

Motor vehicles having pneumatic tires—1 cent per ton-mile of travel over and along the public highways.

Motor vehicles having hard rubber or solid tires—1½ cent per ton-mile of travel over and along the public highways.

In figuring the ton-miles of passenger travel, the maximum seating capacity of each passenger carrying motor vehicle unit (trailers to be included) at 150 pounds per passenger seat, plus the weight of the vehicle, multiplied by the number of miles operated (all divided by 2,000), shall determine the ton-miles of passenger travel per month.

In figuring the ton-miles of freight travel, the maximum freight-carrying capacity of each freight carrying truck or vehicle unit (trailers to be included), plus the weight of the vehicle, multiplied by the number of miles operated (all divided by 2,000) shall determine the ton-miles of freight travel per month.

The motor carrier shall keep a daily record upon a form prescribed by the Railroad Commission of all schedules maintained, motor vehicle and trailer units used, and motor vehicle and trailer units laid up for repairs, during the current month, and on or before the tenth day of the month following shall certify under oath to the Railroad Commission upon such forms as may be prescribed by the Railroad Commission, a summary of the daily record which shall show the grand total ton-miles of travel, both passenger and freight, made by the motor carrier during the preceding month. The daily record of each month's business shall thereupon be filed and preserved for a period of at least five years and thereafter until permission for their destruction shall have been obtained from the Railroad Commission. Such daily record of each month's business shall be examined at least once each year by the Railroad Commission or an authorized representative, and compared with the sworn summaries on file with the Railroad Commission. Any willful falsification of the sworn monthly summaries, in addition to other penalties imposed by this statute, shall result in the immediate revocation of the motor carrier's certificate. Errors in monthly summaries as compared to the daily records shall be adjusted to the figures of the daily records from time to time as discovered, and certified to the County Treasurers by the Railroad Commission in the same manner as the regular monthly certification as hereinafter required.

Regularly each month, on or before the last day of the month, the Railroad Commission shall certify to the various county treasurers in the counties through or in which any motor carrier is operating, the total amount of the special tax due from each motor carrier for operation over the public highways for the preceding month. This tax bill shall be computed by multiplying the total number of ton-miles operated by each motor carrier as shown by its sworn monthly summary to the Railroad Commission by the rate or rates of taxation as in this act specified. Thereupon the county treasurer shall enter the amount of the tax so certified upon the tax books of the county and serve a notice upon the motor carrier of the amount of tax due, which shall be payable not later than the fifteenth day of the month after the date of its certification from the Railroad Commission. All taxes in this manner assessed shall become a first lien upon all the property of the motor carrier until paid. In addition to the remedy upon the bond for collection of the tax, the property of the motor carrier may be advertised and sold for the non-payment of any such taxes in the same manner and at the same time and under the same general rules and conditions as apply to all other property in this state. Upon failure of any motor carrier to pay any tax when due the county treasurer shall notify the Railroad Commission at once, and the Railroad Commission may in its discretion revoke the carrier's certificate.

The money received by the county treasurer from this source shall be allocated to the various city and county road districts in the proportion that the number of miles of public highway used by the taxed motor carrier in any one district bears to the total number of miles used within the county. Such funds shall be used by each governmental agency receiving the same for the maintenance and repair of the highways and streets over which the carrier operates.

SECTION VII. No certificate of convenience and necessity shall be issued by the Railroad Commission to any motor carrier until and after such motor carrier shall have filed with the Railroad Commissioners of this state a liability insurance bond in some company authorized to do business in this state, in such a penal sum as the Railroad Commission may deem necessary to adequately protect the interests of the public with due regard to the number of persons and amount of property involved, which liability insurance shall bind the obligators thereunder to make compensation for injuries to persons and loss of or damage to property resulting from the operation of such motor carrier. Said Railroad Commission shall also require a satisfactory bond in such penal sum and conditioned on the payment of all fees, taxes or charges which may be due the state or any governmental unit in the state under any permit of operation and for the faithful carrying out of any permit granted by said Railroad Commission. No other or additional bonds than as herein described shall be required of any motor carrier by any city or town or other agency of the state.

SECTION VIII. The Railroad Commission in the exercise of the authority by this act vested in it to supervise and regulate all motor carriers shall promulgate such safety rules and regulations as it may deem necessary to govern and control the operation of motor carriers over and along the public highways of this state, and to enforce the same by such penalties and forfeitures as it may prescribe, including the revocation of the permit granted under the provisions of this act. Any such safety rules promulgated in addition to any others deemed necessary by the Railroad Commission shall include the following:

(a) Every motor carrier unit and all parts thereof shall be maintained in a safe and sanitary condition at all times, and shall be at all times subject to the inspection of the Commission and its duly authorized representatives.

(b) Every driver employed by a motor carrier shall be at least 21 years of age, of good moral character, shall be fully competent to operate the motor vehicle under his charge, and shall hold a regular chauffeur's license from the state motor vehicle department.

(c) On passenger-carrying motor carrier

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units passengers will not be allowed to ride on the running-boards, fenders or any other part of the outside of the vehicle.

(d) On freight-carrying motor carrier units no part of the load shall be allowed to project more than 6 inches beyond the running-board of said motor vehicle, or measure more than 8 feet wide over all.

(e) All motor carrier units before passing over any steam or electric railroad track at grade shall be brought to a complete stop at such point within 50 feet of the steam or electric railroad track as will clear the steam or electric track and still allow the driver of the motor carrier to obtain a view of the track in both directions. Then before proceeding to cross said steam or electric railroad track, the driver of such motor carrier shall look in both directions and ascertain if the way is clear.

(f) No passenger-carrying motor carrier unit shall be driven over and along the public highways of this state at a greater rate of speed than 25 miles per hour.

No freight-carrying motor carrier unit shall be driven over and along the public highways of this state at a greater rate of speed than 20 miles per hour.

(g) Accidents arising from or in connection with the operation of motor carriers shall be reported to the Railroad Commission in such detail and in such manner as the Railroad Commission may require.

(h) The Railroad Commission shall require and every motor carrier shall have attached to each unit or vehicle such distinctive markings or tags as shall be adopted by the Railroad Commission.

SECTION IX. All acts or parts of acts in conflict with the provisions of this act are hereby repealed.

SECTION X. Every owner, officer, agent or employee of any motor carrier, and every other person who violates or fails to comply with, or who procures, aids or abets in the violation of any provision of this act, or who fails to obey, observe or comply with any order, decision, rule or regulation, direction, demand or requirement, or any part or provision thereof, of the Railroad Commission, or who procures, aids or abets any corporation or person in his failure to obey, observe or comply with any such order, decision, rule, direction, demand or regulation or any part or provision thereof, is guilty of a misdemeanor and is punishable by a fine not exceeding one thousand dollars or by imprisonment in the county jail not exceeding one year, or by both such fine and imprisonment.

Specifications for Lubricants

Proposed changes in the classification of lubricating oil specifications were discussed at a joint meeting of the Interdepartmental Petroleum Specifications Committee, the Advisory Board to the Committee, the Lubricants Division of the Society of Automotive Engineers, and the Technical Advisory Committee of the American Petroleum Institute, held in Washington, D. C., November 13, at which N. A. C. Smith, petroleum chemist of the Bureau of Mines, presided.

Separate schemes for classification were presented by representatives of the Society of Automotive Engineers and by the Navy Department.

A special committee, composed of Messrs. William S. James of the Bureau of Standards, Dr. T. G. Delbridge of the Atlantic Refining Company, and H. C. Mougey of the General Motors Research Corporation, which was appointed to consider a list of descriptive names to be used for lubricating oils in the federal specifications for explanatory purposes only, reported a majority opinion that four names should be used together with descriptive numbers; light oil, to cover S.A.E. Numbers 15 and 20; medium oil to cover Numbers 30 and 40; heavy oil to cover Number 50; extra heavy oil to cover 60, 80, 95 and 115. It was voted to accept this majority report as the sense of the meeting. A minority report, which follows the present classifications adopted by the Navy Department, was also submitted.

The conference recommended the measurement of viscosities of oils up to 500 series at 100° F.; 600 series and higher at 210° F.

It was further decided to request the Interdepartmental Committee to omit the requirement for organic acidity from all motor oil specifications; also to make investigations into the relation between acidity, emulsion tests and service tests; also into the relation between oxidation and evaporation and service tests.

The Society of Automotive Engineers' lubricating oil specifications shown in Table I were accepted by that body and the American Petroleum Institute in a recent meeting of representatives of both societies with members of the Government Interdepartmental Committee on Petroleum Specifications. As they now stand these specifications represent a revision of the S.A.E. specifications as adopted last summer.

No action was taken on the S.A.E. specifications for transmission oil given in Table II.

Canada's Motor Exports

Canadian exports of automotive products during the month of September were 14 per cent. greater than during August. The total valuation of such exports in the former month was $2,038,030 while August's sum was $1,778,827. Price reductions had no appreciable effect on the total valuations.

The number of automobiles exported was 2,943 in September as against 2,716 in August, an increase of about 8 per cent. Two hundred and seventy-four trucks were shipped in September which may be compared with only 133 in the preceding month. By far the largest number of units were shipped to Australia, with Great Britain a poor second in this regard.

TABLE I.—PROPOSED S.A.E. SPECIFICATIONS OF INTERNAL-COMBUSTION ENGINE LUBRICATING OILS.

Spec. No.[1]	Supplementary Grade Names.	Flash-Point, Deg. Fahr., Min.	Fire-Point, Deg. Fahr., Min.	Viscosity, Saybolt Sec. 100 Deg. Fahr. Min.	100 Deg. Fahr. Avg.	100 Deg. Fahr. Max.	210 Deg. Fahr. Min.	210 Deg. Fahr. Avg.	210 Deg. Fahr. Max.	Color[2] (NPA) S.A.E. Proposal.	Color[3] (NPA) as Revised.	Pour Test, Deg. Fahr., Max.	Conradson Carbon Residue, Per Cent. Max.	Corrosion Test.
15	Light	...	...	...	150	...	..	...	...	..	5 (50-50)	..	....	
20	Light	325	365	180	200	220	42	...	...	5	5 (50-50)	35	0.20	
020	Light	325	365	180	200	220	42	...	...	5	5 (50-50)	10	0.20	
30	Medium	335	380	270	300	330	44	...	...	5	5 (50-50)	40	0.30	
030	Medium	335	380	270	300	330	44	...	...	5	5 (50-50)	10	0.30	Required
40	Medium	345	390	360	400	440	46	...	...	5	5 (60-40)	45	0.40	for all
50	Heavy	355	400	450	512	575	50	...	...	6	5 (70-30)	50	0.60	grades
60	Heavy	360	...	...	...	...	55	60	65	..	5 (80-20)	55	0.80	
80	Extra heavy	380	...	...	...	...	75	80	85	..	5 (85-15)	55	1.50	
95	Extra heavy	390	...	...	...	...	90	95	100	..	5 (90-10)	55	1.75	
115	Extra heavy	400	...	...	...	...	110	115	120	..	5 (95-5)	60	2.00	

[1]For Specifications Nos. 20 and 50, inclusive, the numbers indicate the first two figures of the average Saybolt viscosity in seconds at 100 deg. Fahr. for the grades indicated. The first cipher in Specifications Nos. 020 and 030 indicate that the pour-test value of these two grades is 10 deg. Fahr. The numbers for Specifications Nos. 60 to 115, inclusive, indicate the average Saybolt viscosity in seconds at 210 deg. Fahr.

[2]Darkest color allowed for a mixture of 50 per cent. oil and 50 per cent. kerosene.

[3]Darkest color allowed for a solution made by mixing the oil with the per cent. of water white kerosene noted, e.g., (70-30) means a mixture of 70 per cent. kerosene and 30 per cent. lubricating oil.

General—These specifications cover grades of petroleum oil for the lubrication of internal-combustion engines, except aircraft. Compounded lubricating oils containing products other than those derived from petroleum are not dealt with in these specifications.

Corrosion Test.—The following corrosion test shall not cause discoloration of copper strip. Place a clean piece of mechanically polished pure strip-copper about ½ inch wide and 3 inches long, and 10 cc. of the oil to be tested, in a clean test tube. Close the tube with a vented stopper and hold for 3 hours at 212 deg. Fahr. Rinse the copper strip with sulphur-free acetone and compare it with a similar strip of freshly polished copper.

TABLE II. PROPOSED S.A.E. SPECIFICATIONS FOR GEAR SET LUBRICATING OILS.

Specification No.	Grade.	Flash-Point, Deg. Fahr.* Min.	Viscosity at 210 Deg. Fahr., Saybolt Sec. Min.	Viscosity at 210 Deg. Fahr., Saybolt Sec. Max.	Pour Test Deg. Fahr., Maximum (American Society for Testing Materials Method).
110	Winter	350	100	120	10
160	Summer	450	150	170	45

*American Society for Testing Materials, Cleveland Open Cup.

These specifications cover grades of petroleum oil suitable for the lubrication of gear sets, differential gears, worm drives and roller- and ball-bearings used in connection with such motor vehicle equipment. Compounded lubricating oils containing products other than those derived from petroleum are not covered by these specifications.

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Body-Builders' Exhibit

Elaborate preparations are being made to make the Second Annual Body-Builders' Show in New York a thoroughly representative exhibit. This exposition will be held the week of January 8 to 13 in the 12th Regiment Armory. This is the same week as that of the National Automobile Show in Grand Central Palace.

During this week the Automobile Body-Builders' Association will hold its annual convention in conjunction with the body show. This association includes in its membership and associate membership the leading manufacturers of bodies, body materials and parts therefor. Under the leadership of its president, John Graham, it has developed into a well-knit, strong organization, and is becoming more of a factor in the industry each season.

A large number of the representative American body-builders have engaged space in the show. Realizing that the great majority of prominent automotive men are in New York City during that period, exhibitors see the value of putting bodies and parts before the great number of visitors.

The purpose of this show is to educate and unify the interests connected with body-building, to help to maintain the industry in its rightful position in the automotive field, and to show to the public the merits of body materials and parts.

Both passenger bodies and those for commercial vehicles will be displayed in profusion. Commercial bodies will show a wider variety of adaptability than ever before and especially interesting to many will be the offerings in motor 'bus bodies. The increase in the number of 'bus lines throughout the country is responsible for many of these new types.

Driveways Continue to Grow

October shipping records of the National Automobile Chamber of Commerce show very plainly the continued growth of driveways throughout the industry. That this reflects the acute car shortage on railroads can not but be patent since the carrier problem becomes worse as the weeks go by.

Indicated production for the month was 244,400 passenger-cars and trucks for all makers. The increase over September is thus 20 per cent., whereas last September's figure was greater by approximately 7 per cent. It may also be pointed out that this October saw a 68 per cent. increase of shipments over the same month of 1921. The previous October record was in 1919 with 200,000 cars.

Factory figures for all manufacturers are as follows:

	Carloads		Driveaways		Boat	
	1922.	1921.	1922.	1921.	1922.	1921.
Jan.	15,357	6,485	7,479	3,185	143	93
Feb.	19,636	9,986	10,173	7,507	180	99
Mar.	27,753	16,287	16,917	9,939	560	75
Apr.	31,334	20,187	22,381	14,197	2,960	1,619
May	33,416	18,608	28,827	15,193	7,406	2,381
June	34,230	20,269	33,857	18,834	7,737	3,947
July	29,116	19,514	28,100	15,533	7,030	3,726
Aug.	32,814	20,758	36,754	15,218	10,096	3,595
Sept.	25,950	19,002	30,055	13,840	8,002	2,959
Oct.	*26,980	17,808	*33,320	12,971	*7,040	2,226
Nov.	.....	14,264	.....	10,528	.....	1,402
Dec.	.....	12,310	.....	7,501	.....	188
Year's total	195,478		144,446		.....	22,310

*October, 1922, partly estimated.

EXPORTS OF MOTOR TRUCKS AND PARTS, AUGUST, 1922.

COUNTRIES.	GASOLENE TRUCKS AND 'BUSES. 1-Ton and Less. (No.)	(Value.)	Over 1 to 2½ Tons. (No.)	(Value.)	Over 2½ Tons. (No.)	(Value.)	PARTS. (Value.)
Europe.							
Austria	...	.....	...	.....	...	.....	$ 600
Azores and Madeira Islands	...	.....	...	.....	...	.....	448
Belgium	371	$110,322	1	$ 826	...	.....	31,478
Bulgaria	...	.....	...	.....	...	.....	80
Czechoslovakia	...	.....	...	.....	...	.....	103
Denmark	...	.....	1	1.320	1	$ 2,224	167,468
Finland	...	.....	1	3,200	...	.....	403
France	...	.....	1	1,186	1	1,983	102,408
Germany	...	.....	...	.....	...	.....	796
Gibraltar	...	.....	...	.....	...	.....	105
Greece	...	.....	...	.....	...	.....	8,502
Iceland and Faroe Islands	...	.....	...	.....	...	.....	400
Italy	...	.....	...	.....	...	.....	2,025
Malta, Gozo and Cyprus Islands	...	.....	...	.....	...	.....	190
Netherlands	...	.....	1	2,460	...	.....	6,331
Norway	15	3,515	...	.....	...	.....	11,167
Poland and Danzig	...	.....	...	.....	...	.....	10
Portugal	...	.....	...	.....	...	.....	1,709
Roumania	...	.....	2	3,766	...	.....	2,192
Russia in Europe	40	18,400	...	.....	...	.....	6,043
Spain	2	2,064	...	.....	...	.....	436,246
Sweden	...	.....	...	.....	...	.....	25,815
Switzerland	...	.....	...	.....	...	.....	6,010
Turkey in Europe	...	.....	...	.....	...	.....	2,635
Ukraine	...	.....	...	.....	...	.....	414
England	53	41,925	77	62,099	...	.....	430,685
Scotland	...	.....	...	.....	...	.....	150
Ireland	...	.....	...	.....	...	.....	6,821
Yugoslavia, Albania, etc.	...	.....	...	.....	...	.....	1,121
North and South America.							
Bermuda	...	.....	...	.....	...	.....	45
British Honduras	...	.....	...	.....	...	.....	12
Canada	39	28,648	87	81,855	28	77,346	769,950
Costa Rica	...	.....	...	.....	...	.....	1,486
Guatemala	...	.....	1	1,214	...	.....	910
Honduras	...	.....	3	3,472	...	.....	2,081
Nicaragua	...	.....	...	.....	...	.....	125
Panama	...	.....	...	.....	...	.....	4,719
Salvador	...	.....	...	.....	...	.....	1,196
Mexico	110	47,516	13	19,067	10	25,434	76,012
Miquelon and St. Pierre Islands	...	.....	...	.....	...	.....	32
Newfoundland and Labrador	...	.....	...	.....	...	.....	1,261
Barbados	1	404	...	.....	...	.....	2,049
Jamaica	18	7,906	6	6,592	...	.....	11,587
Trinidad and Tobago	...	.....	...	.....	...	.....	6,887
Other British West Indies	2	504	...	.....	2	4,381	2,710
Cuba	31	11,001	6	6,257	...	.....	30,643
Dominican Republic	2	808	1	1,697	...	.....	13,873
Dutch West Indies	...	.....	...	.....	...	.....	1,275
French West Indies	...	.....	...	.....	...	.....	902
Haiti	...	.....	...	.....	...	.....	3,010
Virgin Islands of U. S.	...	.....	...	.....	...	.....	780
Argentina	...	.....	...	.....	...	.....	85,682
Bolivia	...	.....	...	.....	...	.....	886
Brazil	...	.....	...	.....	3	12,684	80,050
Chile	...	.....	...	.....	...	.....	6,912
Colombia	...	.....	...	.....	...	.....	6,201
Ecuador	...	.....	...	.....	1	2,078	585
British Guiana	...	.....	...	.....	...	.....	1,175
Dutch Guiana	1	325	...	.....	...	.....	700
Paraguay	...	.....	...	.....	...	.....	87
Peru	20	8,080	...	.....	..	.....	6,080
Uruguay	40	9,435	...	.....	...	.....	11,140
Venezuela	2	808	...	.....	...	.....	4,861
Asia.							
Aden	...	.....	...	.....	...	.....	125
Ceylon	...	.....	...	.....	...	.....	520
China	...	.....	...	.....	...	.....	8,944
British India	5	4,032	5	5,061	...	.....	14,950
Straits Settlements	...	.....	...	.....	...	.....	4,505
Java and Madura	...	.....	...	.....	...	.....	9,660
Other Dutch East Indies	...	.....	...	.....	...	.....	1,431
French Indo China	...	.....	...	.....	...	.....	54
Hejaz, Arabia and Mesopotamia	...	.....	...	.....	...	.....	326
Far Eastern Republic	...	.....	...	.....	...	.....	88
Hongkong	...	.....	...	.....	...	.....	427
Japan	...	.....	5	11,838	2	5,369	46,853
Palestine and Syria	...	.....	...	.....	...	.....	16,820
Persia	...	.....	...	.....	...	.....	215
Philippine Islands	...	.....	2	2,112	...	.....	15,541
Greece in Asia	...	.....	...	.....	...	.....	178
Siam	...	.....	...	.....	1	1,800	1,174
Oceania.							
Australia	18	16,226	147	100,311	6	11,453	91,409
New Zealand	...	.....	10	19,678	10	23,036	27,655
Other British Oceania	...	.....	...	.....	...	.....	418
French Oceania	...	.....	...	.....	...	.....	147
Other Oceania	...	.....	...	.....	...	.....	1,170
Africa.							
Belgian Congo	...	.....	...	.....	...	.....	188
British West Africa	12	9,000	1	1,224	...	.....	10,764
British South Africa	...	.....	...	.....	1	1,143	16,710
British East Africa	...	.....	...	.....	...	.....	768
Canary Islands	4	1,616	...	.....	..	.....	8,259
Algeria and Tunis	6	2,185	...	.....	...	.....	.....
Other French Africa	...	.....	...	.....	...	.....	4,321
Egypt	4	1,616	...	.....	..	.....	1,065
Liberia	1	500	...	.....	...	.....	3
Morocco	...	.....	...	.....	...	.....	4,119
Portuguese East Africa	...	.....	...	.....	...	.....	126
Other Portuguese Africa	30	13,137	...	.....	...	.....	267
Spanish Africa	...	.....	...	.....	...	.....	1,482
Total	827	$339,973	369	$335,235	66	$168,931	$2,678,941

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EXPORTS OF MOTOR TRUCKS AND PARTS, SEPTEMBER, 1922.

COUNTRIES.	GASOLENE TRUCKS AND 'BUSES— 1-Ton and Less. (No.)	(Value.)	Over 1 to 2½ Tons. (No.)	(Value.)	Over 2½ Tons. (No.)	(Value.)	PARTS. (Value.)
Europe.							
Azores and Madeira Islands	...	.....	...	.....	...	.....	$ 725
Belgium	460	$106,557	...	.....	...	.....	34,314
Czechoslovakia	...	.....	...	.....	...	.....	350
Denmark	...	.....	1	$ 1,350	...	.....	45,564
Finland	...	.....	...	.....	...	.....	320
France	...	.....	...	.....	...	.....	386,738
Germany	...	.....	...	.....	...	.....	50
Gibraltar	...	.....	...	.....	...	.....	45
Greece	...	.....	...	.....	...	.....	1,164
Iceland and Faroe Islands	...	.....	...	.....	...	.....	489
Italy	...	.....	...	.....	...	.....	6,195
Malta, Gozo and Cyprus Islands	2	808	...	.....	...	.....	722
Netherlands	...	.....	...	.....	...	.....	13,077
Norway	...	.....	...	.....	...	.....	8,807
Portugal	...	.....	...	.....	...	.....	5,970
Russia in Europe	10	5,700	...	.....	...	.....	20
Spain	20	4,687	...	.....	...	.....	84,921
Sweden	...	.....	6	7,850	...	.....	22,322
Switzerland	...	.....	...	.....	...	.....	1,800
Turkey in Europe	...	.....	...	.....	...	.....	1,931
England	...	.....	57	42,315	...	.....	267,851
Scotland	...	.....	...	.....	...	.....	771
Ireland	...	.....	...	.....	...	.....	9,393
Yugoslavia, Albania, etc.	...	.....	...	.....	...	.....	936
North and South America.							
Bermuda	...	.....	...	.....	...	.....	23
British Honduras	...	.....	...	.....	...	.....	443
Canada	47	35,310	48	66,154	11	$ 27,198	1,359,414
Costa Rica	...	.....	...	.....	...	.....	540
Guatemala	...	.....	...	.....	...	.....	1,828
Honduras	...	.....	...	.....	1	3,800	1,064
Nicaragua	...	.....	...	.....	...	.....	322
Panama	...	.....	...	.....	...	.....	3,321
Salvador	...	.....	...	.....	...	.....	1,657
Mexico	41	15,188	9	13,347	5	14,558	81,042
Newfoundland and Labrador	...	.....	...	.....	...	.....	947
Barbados	...	.....	...	.....	...	.....	1,881
Jamaica	6	2,424	...	.....	...	.....	2,629
Trinidad and Tobago	3	2,857	1	1,493	...	.....	6,429
Other British West Indies	1	344	...	.....	1	8,000	1,970
Cuba	58	15,056	4	3,157	...	.....	80,861
Dominican Republic	...	.....	2	4,248	...	.....	9,793
Dutch West Indies	...	.....	...	.....	...	.....	567
French West Indies	...	.....	...	.....	...	.....	2,180
Haiti	3	1,212	2	2,528	...	.....	1,831
Virgin Islands of U. S.	...	.....	...	.....	...	.....	287
Argentina	1	1,129	...	.....	1	3,600	343,539
Bolivia	6	2,408	...	.....	...	.....	2,979
Brazil	...	.....	...	.....	...	.....	44,984
Chile	24	8,416	2	2,248	...	.....	11,132
Colombia	2	1,865	...	.....	...	.....	6,969
Ecuador	...	.....	...	.....	...	.....	428
British Guiana	1	358	...	.....	...	.....	1,525
Dutch Guiana	...	.....	...	.....	...	.....	113
French Guiana	...	.....	...	.....	...	.....	121
Peru	...	.....	...	.....	...	.....	6,404
Uruguay	2	993	...	.....	...	.....	3,480
Venezuela	5	2,020	...	.....	...	.....	5,971
Asia.							
Aden	...	.....	1	1,400	...	.....	12
Ceylon	...	.....	2	2,782	...	.....	2,121
China	...	.....	1	2,810	...	.....	2,683
Chosen	...	.....	...	.....	...	.....	561
Kwantung	...	.....	...	.....	...	.....	214
British India	...	.....	7	8,416	...	.....	32,240
Straits Settlements	...	.....	...	.....	...	.....	7,284
Other British East Indies	...	.....	...	.....	...	.....	99
Java and Madura	...	.....	...	.....	...	.....	7,881
Other Dutch East Indies	...	.....	...	.....	...	.....	962
French Indo China	...	.....	...	.....	...	.....	65
Hejaz, Arabia and Mesopotamia	...	.....	...	.....	...	.....	1,091
Hongkong	...	.....	...	.....	...	.....	2,408
Japan	157	63,746	85	46,386	11	46,575	47,293
Palestine and Syria	...	.....	1	1,000	...	.....	8,595
Philippine Islands	...	.....	...	.....	...	.....	7,043
Greece in Asia	...	.....	...	.....	...	.....	38
Turkey in Asia	...	.....	...	.....	...	.....	20
Siam	...	.....	...	.....	...	.....	133
Oceania.							
Australia	91	69,907	26	30,690	...	.....	94,409
New Zealand	4	5,931	20	22,748	3	9,814	27,723
Other British Oceania	...	.....	...	.....	...	.....	451
French Oceania	...	.....	...	.....	...	.....	1,060
Africa.							
Belgian Congo	1	800	...	.....	...	.....	34,130
British West Africa	4	4,460	5	5,712	...	.....	6,473
British South Africa	3	3,645	1	1,080	3	13,260	38,628
British East Africa	...	.....	...	.....	...	.....	5,602
Canary Islands	11	4,724	...	.....	...	.....	5,385
Algeria and Tunis	2	728	...	.....	...	.....	1,579
Other French Africa	6	2,424	...	.....	...	.....	1,981
Egypt	...	.....	...	.....	...	.....	5,070
Morocco	6	2,424	...	.....	...	.....	1,498
Portuguese East Africa	...	.....	...	.....	...	.....	100
Other Portuguese Africa	...	.....	...	.....	...	.....	220
Spanish Africa	...	.....	1	1,080	...	.....	560
Total	977	$366,121	282	$270,893	36	$126,805	$3,226,764

Storage Battery Standards

At a recent meeting of the Storage Battery Division of the Society of Automotive Engineers' Standards Committee, the following specifications was approved for adoption as S.A.E. recommended practice:

Monobloc Battery Containers—

Height.—Containers shall be made in two heights only; namely, the B height for plates approximately 4¾ inches high, and the C height for plates approximately 5¼ inches high.

Overall Height.—The height from the outside of the bottom of the case to the top of the handle shall not exceed 9¼ inches for B containers, or 9⅞ inches for C containers.

Height from Top of Ribs to Top of Container.—These heights shall be:

B containers 6½ inches } Plus 0
C containers 7 inches } Minus 1/16 in.

Maximum variation between different compartments, 3/32 inch.

Inside Width of Compartments.—5 31/32 inches, plus or minus 1/32 inch.

Inside Lengths of Compartments.—(a) 6-Compartment Containers.

B Containers	C Containers
S-3-B 1 5/16 in.	S-4-C 1 1/2 in.
S-4-B 1 1/2 in.	S-5-C 1 11/16 in.
S-5-B 1 11/16 in.	

(b) 3-Compartment Containers:

B Containers	C Containers
S- 7-B 2 1/16 in.	S- 8-C 2 3/8 in.
S- 8-B 2 3/8 in.	S-10-C 2 13/16 in.
S- 9-B 2 7/16 in.	S-13-C 3 1/4 in.
S-10-B 2 13/16 in.	S-14-C 3 5/16 in.
S-16-B 3 11/16 in.	S-16-C 3 11/16 in.
S-18-B 3 15/16 in.	
S-19-B 4 1/8 in.	

(c) Tolerances of plus 0 and minus 1/32 inch shall apply to container lengths of 3 5/16 inches or less and tolerances of plus 1/64 inch and minus 1/32 inch to lengths of over 3 5/16 inches.

Partitions Between Compartments.—The thickness of the partitions between compartments shall be 3/16 inch minimum and ¼ inch maximum.

Overall Width.—The overall width shall not exceed 7½ inches.

The following recommendation (as well as the foregoing specification) was formulated and will be submitted to the Standards Committee at its next meeting for adoption as an S.A.E. Recommended Practice:

Ratings of Batteries for Isolated Lighting Plants—

Lead-acid storage batteries for isolated electric lighting plant service shall have two ratings, a continuous rating and an intermittent rating. The ratings shall be determined at an initial temperature of 80 deg. Fahr. and shall be based on a final voltage of not less than 1.75 volt per cell.

Continuous Rating.—The continuous rating shall be the capacity in ampere-hours of the battery when it is discharged continuously at the 8-hour rate.

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Intermittent Rating.—The intermittent rating shall be the ampere-hour capacity of the battery at a current rate equal to 1/24 of the said ampere-hour capacity when the discharge is spread over 72 hours.

To avoid night work, the following discharge and rest periods are suggested:

"An initial discharge period of 4 hours, followed by a 16-hour rest; then two 8-hour discharge periods, each followed by a 16-hour rest; the final discharge period being 4 hours."

The short periods at the beginning and at the end permit the test to begin at noon of the first day and end at noon of the fourth day.

Except for the final voltage per cell the ratings apply to nickel-iron batteries as well as lead-acid batteries.

Battery manufacturers should specify both ratings in their catalogs, using the following form:

S.A.E. Ampere-Hour Capacity Ratings: 100-140. The first number represents the capacity based on the continuous rating, and the second number the capacity based on the intermittent rating.

In making this recommendation it was understood that if one of the two ratings proposed is eliminated by subsequent Standards Committee or society action, the division recommendation shall be referred back, as it is considered that the situation can be covered adequately only by specifying both the continuous and intermittent ratings.

43,587 Trucks in Germany

In the past year motor trucks in use in Germany increased 44 per cent. passenger cars 36 per cent. In the preceding year, passenger-cars nearly doubled while trucks increased 54 per cent.

The table shows the number of motor vehicles in Germany:

	July 1, 1922.	July 1, 1921.	Feb. 1, 1920.	Jan. 1, 1914.
Passenger-cars	82,505	60,611	32.450	60,876
Trucks	43,587	30,267	19,742	9,639
Motorcycles	37,941	26,666	9,369	22,557

(Figures for 1922 and 1921 do not include the Saar district.)

The greatest increase in cars was shown in the smaller makes, while in trucks the largest increased the most. Electric trucks advanced from 858 to 1,226.

Exports of motor cars showed a marked increase. In August there were 684 cars exported valued at 388,891,000 marks, compared with 461 in July and 622 in June. In August only 244 were trucks. Motorcycles exported in August total 504 valued at 32,153,000,000 marks, compared with 420 in July and 329 in June. These figures are somewhat behind those for the first months of the year.

Durant Buys New Process

Ending a rather lengthy litigation, Judge Cooper of the Federal court at Albany, New York, on November 3 signed an order confirming the sale of the Syracuse plant of the New Process Gear Company, last remaining subsidiary of the Willys Corporation, to William C. Durant. The bid of Durant's representative was $2,100,000. In connection with the confirmation it was learned of Durant Motors, Inc., that it is Durant's intention to turn the plant over to the T. W. Warner Corporation, Toledo.

The Warner corporation is closely allied with the Durant organization, T. W. Warner himself being a vice-president of the latter concern. The original bid of Warner for the plant was $1,904,000 but this, as well as a subsequent bid of $1,925,500, was rejected by the court as inadequate. It is the intention of the Durant corporation to continue its contractual relations with the New Process company after it becomes a unit of the Warner industry.

Union Truck to Be Sold

The property of the Union Motor Truck Company of Bay City, Michigan, will be sold by the referee in bankruptcy on December 12. The plan of the former stockholders to reorganize was abandoned when it was shown that one-fifth of the $100,000 raised would be required to pay the fees of trustees and receiver and court costs.

The Post-Office Department in Washington has purchased more than $200,000 worth of tires from a number of tire factories in various sections of the country.

Motor Truck and Passenger-Car Production

The following figures show the annual and monthly output and shipments of motor trucks and passenger-cars and index numbers showing (a) the relation between each month's output and the average monthly production for 1919 taken as 100 and (b) the relation between each month's shipments and the average monthly shipment for 1920 taken as 100.

	NUMERICAL DATA					INDEX NUMBERS				
	Production.		Shipments			Production.		Shipments		
Year and Mo.	Trucks.	Cars.	By Rail-road.	Driven Away.	By Boat.	Trucks.	Cars.	By Rail-road.	Driven Away.	By Boat.
1913 monthly av.	1,958	38,458	....	....	....	7	28	...	...	...
1914 monthly av.	2,115	45,307	....	....	....	8	33	...	...	...
1915 monthly av.	6,167	68,218	16,048	....	....	23	49	77	...	...
1916 monthly av.	7,500	124,468	22,598	....	....	28	90	108	...	...
1917 monthly av.	10,680	145,066	22,462	....	....	41	105	107	...	...
1918 monthly av.	18,938	77,199	13,456	....	....	72	56	64	...	...
1919 monthly av.	26,364	138,138	23,726	....	....	100	100	113	...	...
1920 monthly av.	26,837	156,930	20,922	39,239	4,698	102	114	100	100	100
1921 monthly av.	12,090	127,916	16,263	12,031	1,854	46	93	78	31	39
1920.										
May	.....	.....	21,977	74,286	....	...	...	105	189	...
June	.....	.....	22,516	60,746	8,350	...	...	108	155	178
July	.....	.....	23,082	52,342	8,702	...	...	110	133	185
August	.....	.....	23,386	34,060	7,095	...	...	112	87	151
September	.....	.....	20,804	24,431	5,469	...	...	99	62	116
October	.....	.....	17,209	14,127	2,519	...	...	82	36	54
November	.....	.....	13,253	9,497	659	...	...	63	24	14
December	.....	.....	11,802	6,469	89	...	...	56	16	2
1921.										
January	.....	.....	6,485	3,185	93	...	...	31	8	2
February	.....	.....	9,986	7,507	99	...	...	48	19	2
March	.....	.....	16,287	9,939	75	...	...	78	25	2
April	.....	.....	20,187	14,197	1,619	...	...	96	36	34
May	.....	.....	18,608	15,193	2,381	...	...	89	39	51
June	.....	.....	20,269	18,834	3,947	...	...	97	48	84
July	10,766	165,574	19,514	15,533	3,726	41	120	93	40	79
August	13,080	167,705	20,758	15,218	2 595	50	121	99	39	77
September	13,648	144,669	19,002	13,840	2,959	52	105	91	35	63
October	12,813	134,734	17,717	12,926	2,214	49	98	85	33	47
November	10,010	106,042	14,240	10,505	1,402	38	77	68	27	30
December	8,307	70,690	12,100	7,500	134	32	51	58	19	3
1922.										
January	9,358	81,693	15,357	7,479	143	35	59	73	19	3
February	13,133	109,170	19,636	10,173	180	50	79	94	26	4
March	19,665	152,959	27,753	16,917	560	75	111	133	43	12
April	22,237	197,221	31,334	22,381	2,960	84	143	150	57	63
May	23,694	232,431	34,324	28,760	7,366	90	168	164	73	157
June	25,982	263,008	33,000	30,500	7,900	99	190	158	78	168
July	21,357	224,057	29,116	28,100	10,034	81	162	139	71	213
August	24,200	249,225	32,814	36,754	10,096	91	180	157	93	214
September	18,656	187,128	25,950	30,005	8,002	70	135	124	76	170
October	21,416	217,098	26,980	33,320	7,040	81	157	129	84	149

Solid Tire Production

The following figures show the changes in solid tire production by years and months, the index figures being based on the average monthly output for 1921 which is taken as 100:

	NUMERICAL DATA.			INDEX NUMBERS.		
1920—	Production.	Stocks.	Shipments.	Production.	Stocks.	Shipments.
November	21,355	298,875	34,217	60	129	78
December	16,297	303,473	40,828	46	131	93
1921—						
January	21,220	303,753	29,116	60	132	66
February	23,355	304,374	29,599	66	132	67
March	28,710	283,800	43,926	81	123	100
April	28,859	269,985	42,080	82	117	96
May	35,156	264,633	40,122	99	115	91
June	28,395	240,336	49,867	80	104	113
July	35,123	220,003	55,678	95	95	127
August	55,694	216,367	66,866	158	94	152
September	37,441	161,832	50,276	106	70	114
October	46,274	163,299	45,911	131	71	104
November	45,537	173,451	34,556	123	75	79
December	40,478	168,515	34,520	114	73	90
Total for year	424,242	.....	527,517	...	...	...
Monthly average	35,354	230,862	43,960	100	100	100
1922—						
January	40,224	181,769	33,294	114	79	76
February	39,492	183,448	36,805	112	79	84
March	49,433	182,197	48,350	140	79	110
April	46,664	173,748	52,309	132	75	119
May	57,640	170,904	60,711	163	74	138
June	66,089	169,808	63,408	187	74	144
July	72,000	176,000	60,000	203	75	136
August	84,000	190,000	69,000	237	82	157
September	83,000	200,000	68,000	231	86	154

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Metropolitan 'Bus Organization

By H. E. BLAIN

IT has been long realized that satisfactory 'bus operation in London would be impossible unless it covered a much wider field than that of catering to the inner area of the metropolis. Greater London has a population of 7,500,000 and covers an area of 443,000 acres, but the London General Omnibus Company not only provides street passenger carrying facilities for the whole of this area, but extends its ramifications for some 30 miles in every direction taking Charing Cross as the center. At present it operates 149 routes (the longest of which measures nearly 29 miles), covering 1,992 miles. During 1921 868,000,000 passengers were carried and 98,745,000 'bus-miles run, the operating receipts being $43,040,000, and to do this the company employes over 21,000 persons and 3,090 vehicles. Of the latter 312 are 54-passenger "S" type double-deckers carrying 26 inside, 28 outside; 1,056 are of double-deck "K" type, carrying 46 passengers (22 in, 24 outside), and 1,560 are 34-passenger "B" type double-deckers, seating 16 inside, 18 outside. This type will, however, be superseded, as the "S" type, carrying 20 passengers more, can be operated at practically the same cost: the number of the latter is therefore to be increased to 900. Of the rest 125 are single-deck 'buses (the latest designs of which, on an "S" type chassis, carry 30 passengers), and 36 are private hire motor coaches.

All these are built by the Associated Equipment Company, Ltd., and it can not be too strongly emphasized that an omnibus chassis is an entirely different proposition from a truck chassis. Apart from springing and efficiency, all London public service vehicles have to conform to the very severe police licensing regulations, which strictly limit the weight and regulate seating capacity, safety, silence, and other details. For instance, the car must be capable of turning within a 60 foot radius, must have a minimum ground clearance of 11½ inches, and an overhang behind the back wheels of not more than 7-24th of the overall length.

Routes may be divided into three distinct groups:—(*a*) those between the two big traffic centers (the city and the West End) and the suburbs; (*b*) those connecting up outside or suburban areas; and (*c*) those between London and country towns or resorts within the 30-mile area. All these are worked from 32 garages, situated mostly around the fringe of London, to minimize dead mileage.

Largely owing to the British love of fresh air, the double-decker is mainly used. Weather investigations over the last seven years show that 55 per cent. of the days in each year are eminently suitable for outside traveling, 18 per cent. may be termed neutral, and 27 per cent. more suited for traveling under cover. Of the latter figure 63 per cent. falls between November to February inclusive, and 47 per cent. is due to unfavorable temperature, 53 per cent. to the weather. Further investigations show that the loss of traffic due to unfavorable conditions is limited to 17 per cent., the larger part of which is due to the temperature.

Single-deck vehicles are used where low over-bridges, weak under-bridges, or special physical conditions, such as dangerous hills, render the double-decker undesirable.

The garage organization is practically confined to maintenance and running adjustments, major repairs and overhauls being carried out at the central overhaul works [described in POWER WAGON, March, 1922], where are also the central employment organization and training school. Broadly the work of the garage is divided into:—(1) Engineering, and (2) operating sections, the former being equipped with a few machines, such as small lathes, sensitive drills, screw presses, and emery grinders. Here the staff from three to six hours a day effect the necessary replacements and adjustments reported by the drivers. Little night work, other than cleaning, is carried out.

On the operating side output assistants deal with the allocation of drivers' and conductors' duties, depot cashiers with the daily receipts.

Minor offences come before the garage superintendent, but serious ones are reported to the Disciplinary Board, which sits once a week, though from the decisions of this board the men have the right of appeal to the operating manager, although this is not frequently exercised.

On finishing its daily work an omnibus is driven to one of the garage gasolene filling points, the interior being brushed out simultaneously with fuel replenishment. It is then driven within a washer consisting of a series of pipes on each side, by which the vehicle is sprayed with water at high pressure. This occupies but two minutes. The washing equipment has saved the company over $400,000 a year in labor. The car is then shunted to its garage position, where the men who have operated the washing machines finish their eight hours duty in cleaning off the windows and polishing the brass work.

Besides the rectification of any reported defects, a thorough nightly examination of mechanism is made. Steering levers are kept bright to facilitate this examination, and the otherwise-out-of-sight underneath parts are examined by hand mirrors. Any doubtful part is removed for further examination and replaced by a sound component. Each mechanic must sign a sheet certifying his examination and the safe condition of the machine. Five per cent. of the cars are retained in garage daily for a more complete examination and adjustment, any defective parts being replaced by spare units. These defective parts are collected periodically and taken to the central overhaul works. A complete record is kept of each unit, giving the date when fitted and removed from Chassis, and analyses of these records are continuously being made.

Each 'bus goes out daily with 22 gallons of gasolene. When this is replenished the added quantity is noted, as is the surplus at the day's end, and from these the mileage per gallon for each car is calculated every night. Each garage has a staff specializing in engine adjustment and tuning, and these men devote their attention to the six omnibuses showing the worst consumption on the daily chart. Consumption is further economized by the employment, in each of the four districts into which the garages are grouped, of a carbureter and engine expert, who is sent to the garage with the highest consumption.

Careful records, too, are kept of lost mileage, so as to maintain close observation on its various causes.

Omnibus operation is practically permanent, and the pay compares favorably even with the skilled trades. Selected applicants undergo a careful medical examination, the record thereof being permanently maintained. All matters pertaining to the employment, training, clothing, and catering arrangements for the staff are supervised from one center to get a common standard throughout.

In training the cinema has been found most useful in imprinting essential points on the minds of the staff.

IN THE training school drivers are taught enough about their chassis to enable them to act intelligently in service. They are not encouraged to deal with repairs. They are then trained in actual driving, but are only allowed on the public streets when they have demonstrated their thorough capability. They then finish their training course under actual traffic conditions, and are finally submitted to a very severe test by the Metropolitan Police before obtaining their licenses. This training on an average occupies 28 days.

Similarly, conductors are thought the use of tickets, change, way-bills, telephones, and how to make a proper report on any traffic occurrence. They are next trained in actual work on practice omnibuses before obtaining their police licenses. In their case the training period averages about two weeks.

The employment and training center is also the headquarters of the catering administrative staff. At garages and important permanent points there are 28 canteens, where the men can obtain food at a price just covering its wholesale cost and the wages of the necessary staff. In a year receipts amounting to $447,050 represented 4,335,306 separate sales.

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In selecting routes careful study is necessary of the varying traffic characteristics of the areas affected, including business, shopping, entertainment, and country runs. As far as possible each residential suburban district should have a choice of routes to the city or business center, and the West End or shopping and theater center, as well as travel facilities to surrounding suburbs, and probably to the country. Long routes have been found advantageous. In a great city there is a surprising support, too, for routes between suburbs with seemingly no direct relation to each other.

Once a route and the garage serving it have been decided, the mileage and times should be carefully taken on an actual road test, the probable stops in actual service being observed as nearly as possible, and the time taken between each stopping-point to give an actual time-card. Only thus can regularity of headway be maintained and timing schedules checked. Comparatively short experience will show the accuracy of the planning of the route, though it is astonishing how facilities induce traffic.

Passenger loadings and exchanges should be continuously and scientifically analyzed. Only by experienced preparation of time-tables and duty sheets can the best results be obtained, and specimens are herewith given of the L. G. O. loading diagram and that showing trip earnings per hour.

With the present stringent labor conditions and prevalence of the 8-hour day, different arrangements of duties may be necessary on different routes. On some the traffic may be so uniform that double shifts can be employed; on others affected by business rush hours the number of omnibuses may have to be reduced at midday and late evening; other routes, again, have important midday, shopping and evening amusement traffic, and so on. The form of loading chart is therefore important.

The following tables show the three different systems of duty schedule employed in London. When each omnibus day can be divided into two equal parts a "straight double shift" can be worked. (Schedule A). In this case short meal-times only are required, and are given on the stand at terminal point.

If the day's work can not be divided into two equal parts and longer meal times than can be given on the stand are required, the "dropping down" system is introduced (Schedule B). For duties 1, 2, 7, and 8 meal-time is provided between handing over one omnibus and taking another. Duties 3, 4, 5, and 6 are short and do not require meal relief.

Where the traffic fluctuations spread over duties are worked as in Schedule C. Duties 3 and 6 are here "spread-over" duties.

No fares applicable to every undertaking can be prescribed: they must depend on the nature of the traffic, the extent of the area served, the character, business and pleasure habits of its residents.

Certain general principles may, however, be considered. Fares may conveniently be studied from three points of view: that of the undertaking, that of the traveling public, and that of the operating staff.

From the first viewpoint fares should be fixed on such a basis that the receipts will, after paying working expenses and provision for depreciation and reserve, offer a reasonable return on capital.

The interests of the public are to a great extent identical with those of the undertaking, though this is not generally appreciated. The thinking public does not expect to be carried under cost, but the man in the street, if he can not understand the principle on which he is charged, will think he is being robbed. The system of fares should therefore be simple in principal and application.

Simplicity is also of great importance to the operating staff. The conductor's work should be facilitated as much as possible, so that he may be the less likely to overlook passengers failing to pay their fares or over-riding their farepoint, and so that he may have more time for his other duties. In theory at least payment should always be a cash transaction; transfer and through tickets complicate collection. The Conductor is called upon to account for bits of paper as well as tickets, and unless he is highly trained and intelligent, this may make it difficult for him to check passengers in paying their proper fare.

Reference may here be made to two distinct and recognized bases for fixing fares. Until quite recently the "flat fare" system was adopted in most American towns—one fare for all distances traveled. Simplicity is the main advantage of this method, but unless the services are limited to a small area it operates unfairly as between short and long-distance riders: the long-distance passenger travels too cheaply, the short-distance rider pays too much. Such a system could not be employed in London where many of the routes are over 20 miles long, while few are under 8 miles in length.

The other method, known as the "zone" system, has been adopted in practically every United Kingdom town service. Under this system passengers are charged according to distance. In normal times generally the unit fare is 2 cents, but, recently, owing to increased cost of operation, it has in some instances been raised to 3 cents, or in others to 4 cents. The correct minimum can only be set with a due regard to all the individual circumstances.

In theory it costs the same to carry one passenger as another for a given distance. Therefore, theoretically, all passengers should be charged on the same basis. But in this country tramways and railways issue cheap fares to the working classes traveling to and from their work. In practice this rate applies to all who take a return ticket before a certain hour in the morning, but in some areas of London we also have the cheap 4-cent fare under which any passenger between the hours of 10 a. m. and 4 p. m. can travel any distance for a maximum fare of 4 cents.

In fixing fares another consideration is the capacity of the vehicle. Where physical conditions prevent the use of a large capacity vehicle, higher fares may be necessary. In practically every undertaking, the traffic at certain hours is heavier than during the remainder of the day, and sometimes with a small car the full benefit of the rush hours can not be secured in a measure to compensate for the poor traffic experienced during the slack hours.

The London omnibus fare system is based upon mileage, and the average charge per mile in 1921 was just below 2 cents.

International Hotel 'Bus

The International Harvester Company has introduced a de luxe 'bus for hotel, club and resort use. It is known as the International Model S speed sedan. The top is art-craft construction. The seats are wide and deep cushioned. Fourteen to fifteen passengers may be comfortably seated.

Entrance is obtained through three side doors, while a passage at the end of the third seat gives easy access to the rear without disturbing other passengers. Speeds of 25 to 30 miles per hour can be maintained. The length of the chassis overall is 185 5/8 inches. Heavy pneumatic truck cord tires are a part of the regular equipment.

SCHEDULE A.

FIRST SHIFT			SECOND SHIFT		
Duty No.	'Bus No.	Hours.	Duty No.	'Bus. No.	Hours.
1	1	7:00 a. m. to 2:40 p. m.	5	1	3:20 p. m. to 11:00 p. m
2	2	7:20 a. m. to 3:00 p. m.	6	2	3:40 p. m. to 11:20 p. m.
3	3	7:40 a. m. to 3:20 p. m.	7	3	4:00 p. m. to 11:40 p. m.
4	4	8:00 a. m. to 3:40 p. m.	8	4	4:20 p. m. to 12:00 p. m.

SCHEDULE B.

1	1	7:00 a. m. to 12:40 p. m.	5	1	4:20 p. m. to 11:00 p. m.
	3	2:00 p. m. to 4:20 p. m.	6	2	4:40 p. m. to 11:20 p. m.
2	2	7:20 a. m. to 1:00 p. m.	7	1	1:20 p. m. to 3:40 p. m.
	4	2:20 p. m. to 4:40 p. m.		3	5:00 p. m. to 11:40 p. m.
3	3	7:40 a. m. to 1:20 p. m.	8	2	1:40 p. m. to 4:00 p. m.
4	4	8:00 a. m. to 1:40 p. m.		4	5:20 p. m. to 12:00 p. m.

SCHEDULE C.

1	1	6:40 a. m. to 2:00 p. m.	7	1	2:40 p. m. to 10:40 p. m.
2	2	7:00 a. m. to 2:20 p. m.	8	2	3:00 p. m. to 11:00 p. m.
3	3	7:20 a. m. to 11:20 a. m.	3	3	3:20 p. m. to 7:20 p. m.
4	4	7:40 a. m. to 3:00 p. m.	9	4	3:40 p. m. to 11:40 p. m.
5	5	8:00 a. m. to 3:20 p. m.	10	5	4:00 p. m. to 12:00 p. m.
6	6	8:20 a. m. to 12:20 p. m.	6	6	4:20 p. m. to 8:20 p. m.

Gotham's Electric Cabs Running

The first electric taxicabs that have appeared in New York's streets since the old electric hansoms of nearly 25 years ago are now part of the fleet of the electrotaxi Corporation. The service will be expanded from time to time until a large number of machines is in operation.

Under the company's plans the vehicles will be kept on the street from 18 to 20 hours a day through the medium of interchangeable batteries. A maximum operating radius of 120 miles daily and a maximum speed of 25 miles an hour can thus be maintained.

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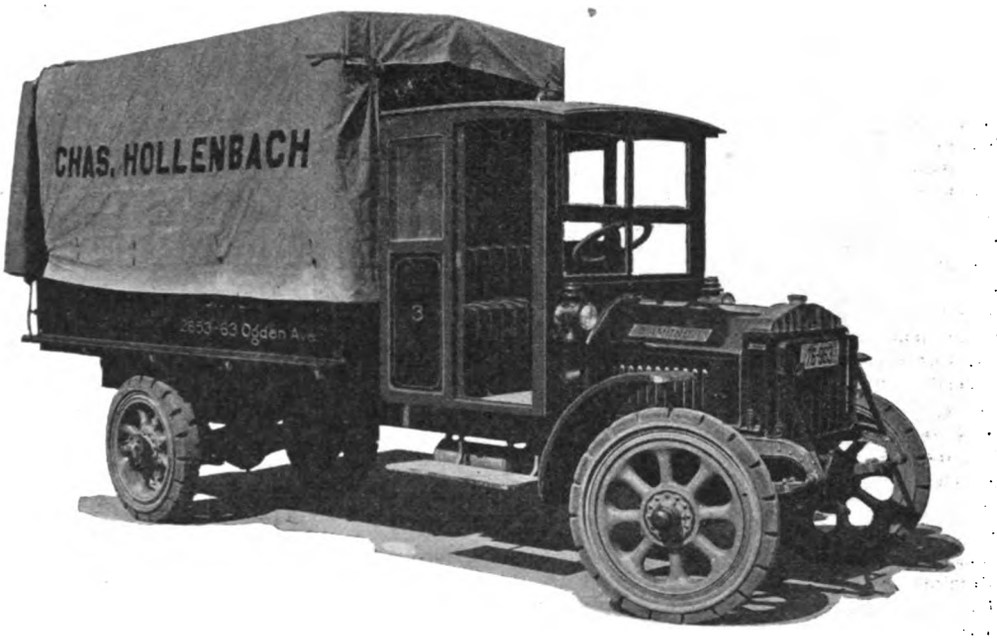

DIAMOND T

have been using the rigid type of Smith Wheel as standard equipment, with entire satisfaction, for the past four years on their 3½ and 5 ton models.

Smith Wheels in the 2-2½ ton size are the greatest sellers because many more trucks of this capacity are built than of the heavier models.

Smith Cushion Wheels as well as the pneumatic type for light duty trucks are rapidly increasing in demand and popularity.

SMITH WHEEL
SYRACUSE N.Y. U.S.A.

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High First Cost Not Important

By A. C. GODWARD
Chief Engineer, Minneapolis Park Board, Minneapolis

IN automotive equipment the vital things are depreciation, maintenance and repairs. I have chosen particularly the economic side of automotive equipment to show the value of records of operation, maintenance and repair to the owner, the designer and the manufacturer. Twenty years ago we thought only of mules and manpower. I remember the first tractor I had was a great disappointment. The tractor today is a joy forever. Through all these years as a personal hobby I have kept records of performance, cost and depreciation; they have shown how the designer has gradually eliminated the undesirable features and made automotive equipment an economic working unit.

In the automotive equipment the proof of design and mechanical construction is in the operation. Contractors as a group were as vitally interested in the development as were the designers and the builder, and being constantly at the operating end they were in a position to observe and record accurately the performance of the equipment and to give constructive criticism. A few with limited technical knowledge appreciated their position and responsibility and assisted the designer and the serviceman in eliminating faulty features. To them much credit is due. Experimentation, the creation of new alloys, the design of new bearings and appliances, the elimination of unnecessary parts and weight, standardization, better ignition, carburation, transmission and balance and all the other improvements in equipment and accessories with which we are familiar to-day were continued until at last the many types approach perfection in design and application.

Progress automatically eliminates the contractor who will not see. To-day contractors manage their equipment investment in an efficient and economical manner and designers and builders can procure reliable and accurate statements of performance, detailed as to quality, quantity and cost. Competent public officials have learned to treat pieces of equipment as individuals and to study them as economic units. There is now something more than intangible kicks upon which to base study and design. The day is gone when eqpipment is bought as a one-job investment or at the whim of a public official regardless of economic principles. The trend of the times is shown by the development by the contractors' association of a schedule of depreciation and rental, and by the tendency of contractors to rent the equipment to their own projects at a predetermined rate per hour or day so as to assure a sufficient return of all costs regardless of the status of the project. Road construction is a continuing business and equipment must be designed and purchased accordingly.

Many of the municipal contractors to-day are following the plan mentioned; instead of letting their machinery go with the job if the job goes wrong, they let the job go where it will but assure a return on that piece of equipment sufficient to maintain, repair and put it into condition for the next job when they are fortunate enough to get one. The Associated General Contractors adopted a schedule in July, 1920 predicated upon an expense divided into seven parts. This was made a basis of rental and is illustrated by a typical case shown below, on the assumption of a 6-year useful life.

Items.	Percentage of Original Cost.
Average annual depreciation	12.5
Equivalent annual interest	4.0
Shop repairs	6.0
Field repairs	4.0
Storage and incidentals	3.5
Insurance	1.0
Taxes	1.0
Total	32.0

Based on 8 months of operation this total of 32 per cent., is a rental per month of 4 per cent. of the original capital investment. The average depreciation is based on the economic life of a machine that is supposed to end when the value of the machine shall have depreciated to 25 per cent. of the original cost. The annual depreciation is 75 per cent. of the original cost divided by the number of years during which experience has shown it can be expected to give service. The equivalent annual interest is based on the prevailing rate each year on the depreciated value. The other charges are self-explanatory, a division being made between shop and field repairs for the purpose of computing different terms of rental. Nearly 100 items of equipment enter into consideration and the annual depreciation varies from 75.0 to 7.5 per cent., depending upon the type of machine and the class of work.

In municipal work we began the practice years ago of considering all equipment requiring an operator as an individual unit, renting it to the project on which it was being used at a fixed cost per hour and at a rate to assure a return sufficient to cover all fixed and operating costs and create a small reserve for emergencies. We based the rental charge on nine instead of seven component parts, five of which were fixed charges and four were operating charges. The fixed charges are: (*a*) average annual depreciation, (*b*) equivalent annual interest, (*c*) storage and incidentals, (*d*) taxes and (*e*) insurance. Depreciation was included as a fixed charge regardless of hours of operation per year, as improved designs make obsolescence a deciding factor. The operating charges are (*a*) shop repairs and overhaul, (*b*) field repairs, (*c*) operating cost while employed, and (*d*) cost of maintenance, which consists of overtime work of adjusting, oiling, greasing and the like. The cost of time lost while equipment is on a project but not in condition to operate is obviously to be distributed among the other components, but a record is kept of all time lost and all non-productive labor so as to complete the performance record of both the machine and the operator. Continuous records have been kept of the various types of equipment in our service, and the rental basis has been adjusted each year to meet the fluctuating costs of labor and supplies. Such records prove to be educational, promote economy in purchase, operation, maintenance and repair, and are of value to the company from which equipment is purchased.

Without going into details, illustrations of three typical accounts will be of interest. Actual costs as percentages of the original investment and based on 1,600 operating hours per year were shown in Tables I and II for a 5-ton dump-truck, track-laying tractor and a steam shovel. Being actual accounts of individual units these records are not intended as typical of the several classes of equipment, but are given only to illustrate the practical solution of the economic principles involved. The 5-ton dump-truck was purchased in 1920 and cost $5,700. Its estimated useful life is 4 years, and its total operation was about 3,200 hours when the truck was completely overhauled and retired, ready for

TABLE I.—COMPARATIVE RECORDS OF EQUIPMENT OPERATION.

Equipment.	Truck		Tractor		Steam Shovel	
Items.	Percentage of Initial Cost.	Actual Annual Cost.	Percentage of Initial Cost.	Actual Annual Cost.	Percentage of Initial Cost.	Actual Annual Cost.
Average annual depreciation	19	$1,083	15	$ 900	11	$ 880
Equivalent annual interest	4	228	4	240	4	320
Storage and incidentals	3	171	3	180	3	240
Insurance	1	57	1	60	1	80
Taxes	2	114	1	60	1	80
Total fixed charges	29	$1,653	24	$1,440	20	$1,600
Shop repairs	8	$ 470	12	$ 720	11	$ 904
Field repairs	7	400	10	600	6	467
Operating cost	35	2,010	50	2,960	100	8,028
Maintenance	2	114	4	264	4	320
Total operating charges	52	$2,994	76	$4,544	121	$9,719
Total annual cost	81	$4,647	100	$5,984	141	$11,319

[Read before the Society of Automotive Engineers.—Ed.]

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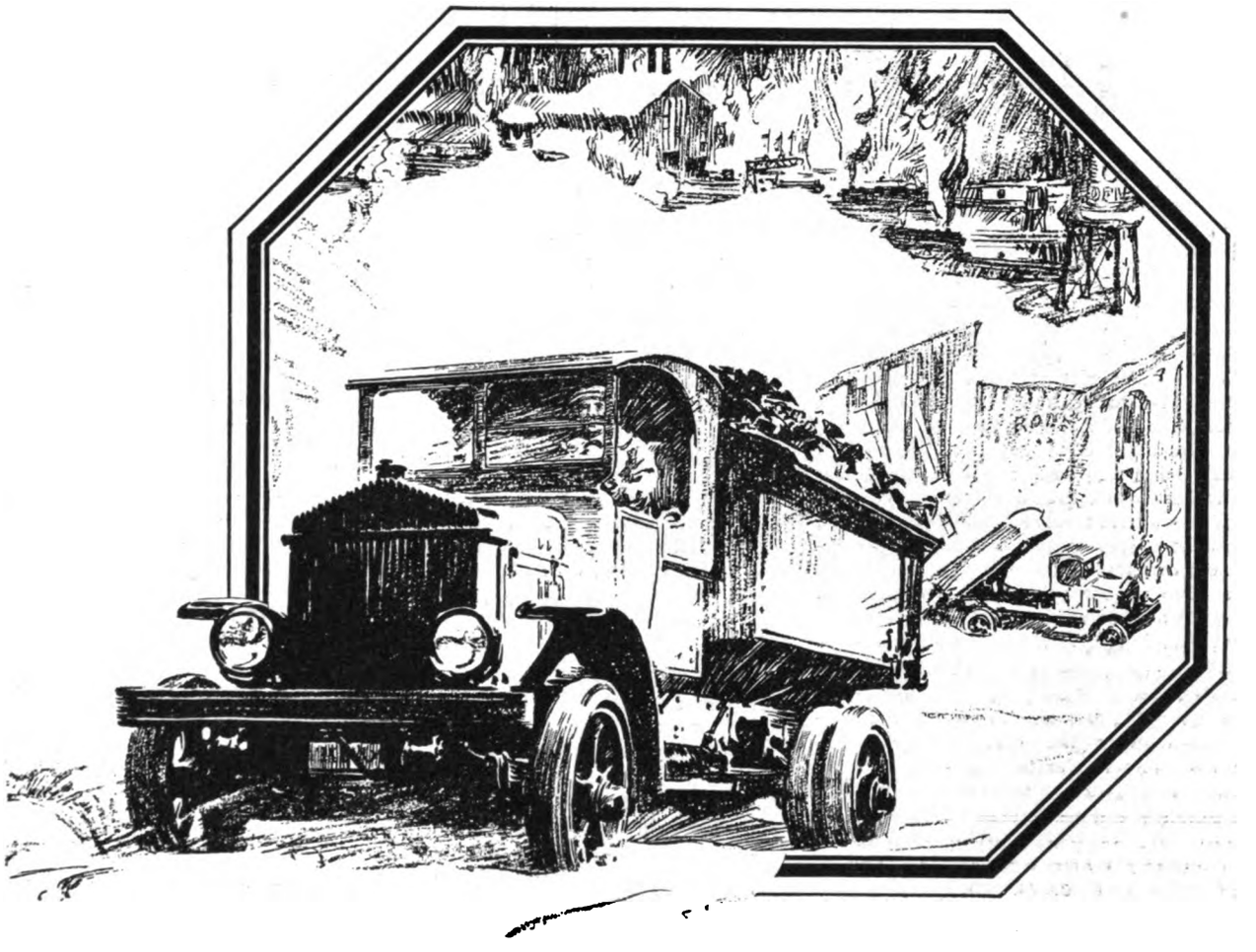

Pierce Arrow

WORM-DRIVE DUAL-VALVE MOTOR TRUCKS

Pierce-Arrow sponsored and proved the soundness of the *worm-drive* principle . . . Pierce-Arrow also pioneered the *dual-valve* engine for trucks . . . Forty-four of the first fifty Pierce-Arrow Trucks built (delivered in 1911) are still in service . . . More than $100,000,000 worth of Pierce-Arrow Trucks have been built and sold . . . These facts indicate the reasons why Pierce-Arrow Trucks are so profitable to own . . . so profitable to sell . . . If we are not represented in your locality and you feel you have the proper qualifications, get in touch with us.

THE PIERCE-ARROW MOTOR CAR COMPANY
Buffalo, New York

Chassis Prices:

2-Ton . . .	$3,200
3½-Ton . . .	4,350
5-Ton . . .	4,850

F. O. B. Buffalo

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the 1922 season. The tractor was purchased in August, 1919, and cost $6,000. Its estimated useful life is 5 years. It was used largely with elevating graders and grub plows. Its total travel was 4,000 miles and the total time of operation 3,400 hours. The tractor was put in complete repair for the 1922 season. The ¾-cubic yard steam-shovel was purchased in August 1919 and cost $8,000. Its estimated useful life is 7 years. The total length of operation was 3,921 hours and the total amount of material handled was 109,700 cubic yards. This equipment was put in complete repair for the 1922 season.

The records of these particular units are given for three reasons: (*a*) the equipment built prior to 1919 was not up to the standard of the present day and comparisons would not be equitable; (*b*) each of these units has been operated continuously for 2 years, somewhat more than the estimated 1,600 hours per season, and has been completely overhauled and reëquipped ready for the coming season's work so that all charges are included; (*c*) the truck represents the lowest ratio of operating cost to fixed charge, and the steam-shovel the greatest.

I do not know how many are accustomed to view the cost of mechanical service from this angle, but I wish to call attention to what seems to me the out-

TABLE II.—COST PER MILE, PER HOUR OPERATED AND PER CUBIC YARD EXCAVATED.

Items.	Truck.	Tractor.	Steam Shovel.
Fixed cost:			
Per mile traveled[1]	$0.18	$0.80	$0.021
Per hour operated	1.03	0.90	1.000
Operating cost:			
Per mile traveled[1]	0.33	2.43	0.126
Per hour operated	1.87	2.84	6.060
Total cost:			
Per mile traveled[1]	0.51	3.23	0.147
Per hour operated	2.90	3.74	7.060

[1]For the steam shovel, this is per cubic yard excavated.

standing feature of these records, namely, the ratio of operating costs to fixed charges; 2 to 1 for the truck, 3 to 1 for the tractor and 6 to 1 for the shovel. The ratio of practically all other equipment comes between these extremes. Initial cost of equipment enters into the cost of service only in the fixed charges and, of these, depreciation is in every case more than 50 per cent. The percentage of depreciation varies inversely as the quality of the machine and as the initial cost. Machines of good design and high standard depreciate slowly. The higher the grade of the equipment is, the lower the fixed charge will be, as the decrease in depreciation will more than offset the small increase in the other components. Good design and construction decrease every item of operating cost; reduce shop and field repairs, lessen the amount of maintenance, tend to a more economical use of fuel and oil and result in better morale among the operating force. Good design and construction reduce lost time, increase output and decrease unit costs of work. I know of no better argument for the elimination of cheap or even doubtful materials and designs, regardless of the increase in the initial cost, than the fact that, based on the annual cost of productive performance, a high initial cost increases only from 7 to 10 per cent. of the total and reduces all other factors.

Records such as these carried through the life of a machine, with all operating costs itemized in detail, should and will become standard practice among all operators who expect to continue in and profit by the business. They will be good economy, for they will prove to the owner that

(1) Equipment is only as good as its operator, and cheap manpower is a fallacy.

(2) Proper maintenance after operating hours decreases all other operating expenses, increases performance and justifies as much overtime as may be necessary.

(3) With funds to cover the cost set aside from earnings, shop repairs in winter are well done without stinting and lost time becomes negligible.

(4) First cost is no criterion; as fixed charges, aside from depreciation, which will reduce as standardization is perfected, are not excessive.

(5) The guide to purchase is operating cost and performance made possible by continuous efficient service.

Such records will show the designer and builder the success or failure of the product, what improvements are essential or desirable, the changes that will adapt the equipment to new conditions that may be encountered, the necessity of more educational propaganda, the desirability of a better inspection of materials and especially of the assembly, and the economic necessity of building the best that their ingenuity can devise for the operator who is in business to stay and buys and handles his equipment accordingly. Records that will permit the analysis of the cost of operation, maintenance and repair, as related to the fixed charges, are the means by which those who operate can assist the automotive engineer and the builder in the final standardization and perfection of types that will bring success in construction work.

We operate practically at the union scale. We pay time and one-half for overtime and the union scale in Minneapolis is higher than that paid by the ordinary tractor or commercial house. Operators received from 70 to 90 cents per hour during 1920 and 1921. The operator of a steam-shovel gets about $1.25 per hour.

We pay our men by the hour and expect them to operate 8 hours per day, the same as ordinary construction forces. After the day is over we expect every operator to see that his machine has the proper maintenance. It takes from 30 minutes to 1 hour. He is paid for the time he puts in. On Sunday we insist that he drain the crankcase and clean the machine. For that time he is paid or will be paid straight time; in 1920 he was paid straight time and in 1921 time and one-half.

This maintenance charge, when many records of automotive equipment are analyzed, amounts to a considerable sum in dollars and cents, but the cost per mile or per cubic yard or per ton hauled is very small. Proper maintenance eliminates lost time almost entirely. Lost time is intangible; the lost time of a truck or shovel or piece of equipment is small and does not mean much. But if it disorganizes a crew of 100 men and 50 teams for 1 hour, it means money. It is something you can not put down in black and white; it is nothing to which one can take oath; but by the time a job is finished the lost time is appreciable.

We do not claim originality in our methods of keeping the cost of equipment. We consult the distributors, get letters from the builders, and in many instances are personally acquainted with the designers. We find that their recommendations are not always the same; but we try to use the best of their several recommendations for our particular use. Being a comparatively small organization I doubt if our cost system would be applicable to a fleet of from 30 to 50 trucks or tractors. We have a number of different types with diversified equipment and adapt our accounting system to particular cases.

The reason that we get 8,000 hours of work out of a tractor, or expect to, is that it is given proper maintenance. The man who drives that tractor does not abuse it, he sticks to it, he thinks something of it. Those who drive automobiles and many who drive trucks do not own the vehicles and do not care about costs. They get out at 20 degrees below zero fahrenheit and try to start with the starter when all that would be necessary is a little cranking. They do not watch the road. One could name many instances where money is spent that could be saved. In handling a tractor, wheeled machine or steam-shovel each operator knows that the length of his job depends upon the cost of operation and governs himself accordingly. One can not emphasize too much the statement that maintenance means life, lower depreciation and service. The reason we get these things from high-priced machines is that we get high-priced men to run them, men who care for them.

It is unfortunate that the man who governs is supposed to furnish the brains and set the example. The passenger-car has lost its usefulness after 3 years at the most. Depreciation, instead of being 15 per cent., is 25 per cent. Fixed charges and operating costs run about 50-50. The same is true of trucks. The depreciation is higher than it should be. We hope with the assistance of the builder and the designer, and with a little cooperation form the operator, that the depreciation of trucks will not be 25 per cent.

In regard to the 8,000-hour life and some of the other lives that might seem too long, the machines are rented at a fixed rate per hour. The revenue from this rental is sufficient to give proper field repairs in addition to maintenance and proper shop repairs in winter. We do not consider that the machine is junk from the fact that it is in poor condition; we figure that as operating expense and have money for replacement. By proper replacement and repairs the life of the machine is lengthened, but this can not be financed by hauling material at 10 cents per ton-mile in a truck. There must be the proper revenue to give the machine proper care.

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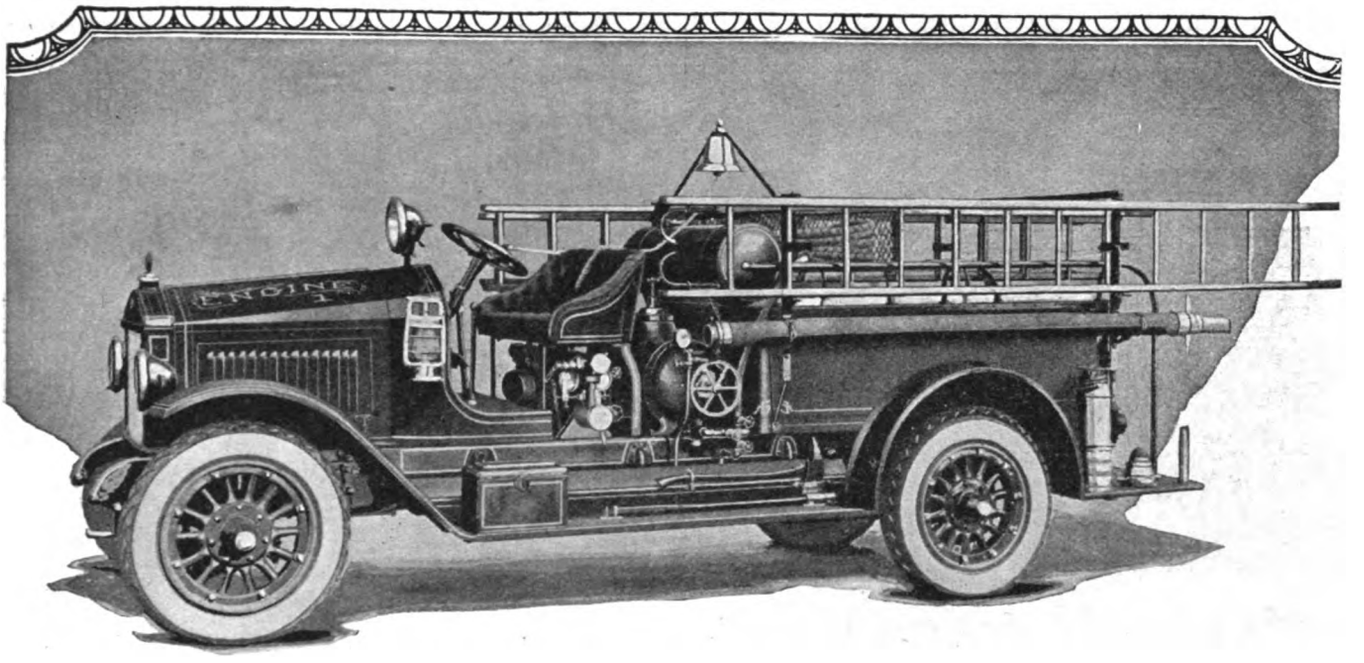

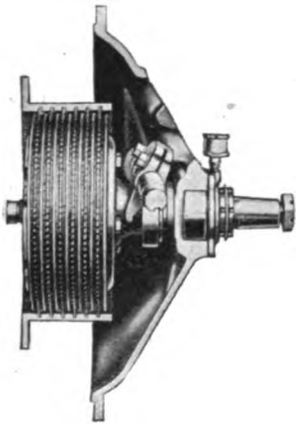

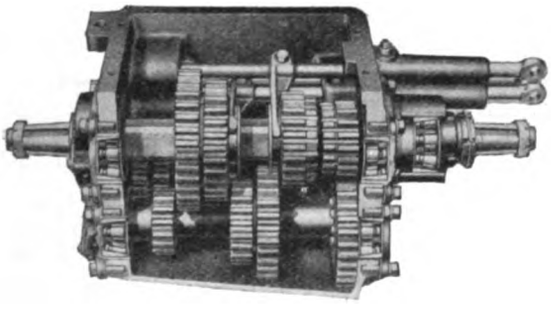

Where Life and Property Loss Threatens

STURDY, sure-working units are nowhere so necessary as in automotive fire-fighting apparatus. In no other service is the strain so heavy, the danger of collision so great or the penalty of a breakdown so costly.

High in importance among these units is the transmission; for upon it, as in the apparatus shown above, depends both the ability to reach the location quickly and to pump the flood of water that quenches the flames.

Brown-Lipe Gear transmissions have proved their great value in this work, just as they are doing every day in thousands of motor trucks and cars. Also, in case of a smash-up, genuine replacement parts are quickly obtainable.

BROWN-LIPE-GEAR
TRANSMISSIONS

BROWN-LIPE-CHAPIN
DIFFERENTIALS

Both at Syracuse, N.Y.

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MOTOR TRUCKS

Model 33, 1½-2 Ton Bus

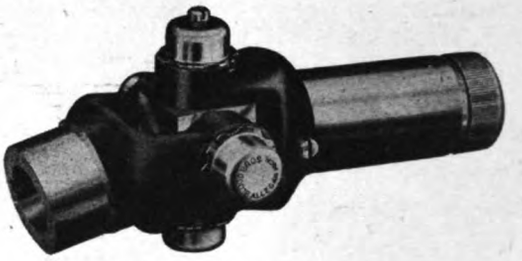
Operated by

STAR TRANSPORTATION COMPANY
MASON CITY, IOWA

SWIFT - ECONOMICAL - POWERFUL

Denby Motor Truck Company
DETROIT, U. S. A.

BLOOD-BROTHERS
Oil Lubricated
Universal Joints



"STAY PUT"

More than thirty-five leading automobile truck and tractor manufacturers have definitely solved their universal joint problems by using this trouble proof joint as standard equipment. It will pay you to

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Blood-Brothers Machine Co.
Pioneer Builders of Universal Joints

ALLEGAN Y — F. Somers Peterson Co. San Francisco, Cal. Western Representative — MICHIGAN

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We Specialize in Financing Freight Truck Lines!

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¶ Do you believe that, in the majority of cases, city merchandise can be more economically transported by power wagons than by horses?

¶ Of course you do.

¶ But do you know the extent of the economy to be gained by the substitution of motor trucks and wagons for horse drawn vehicles?

¶ Few people do.

¶ "The Power Wagon" assists every branch of business in which local transportation plays an important part, by showing how and to what extent motor vehicles may be used to advantage.

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"That 90% of truck makers advise Wood-Detroit equipment attests its mechanical superiority; that 90% of users specify Wood-Detroit, proves its service."

Gar Wood

Built by Gar Wood

The dominance of Wood-Detroit Hydraulic Hoists and Steel Bodies in the dump truck field is so thorough that they not only exceed any other make, but all others combined.

Only an unequalled service record can account for this.

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Hydraulic Hoists and Steel Bodies

If you are interested in dependability in your truck equipment; in speed; in labor saving; and in economy in handling bulk loads; if you demand full efficiency, specify Wood-Detroit.

We will gladly advise you as to the best size and style of Wood-Detroit equipment for your work and chassis.

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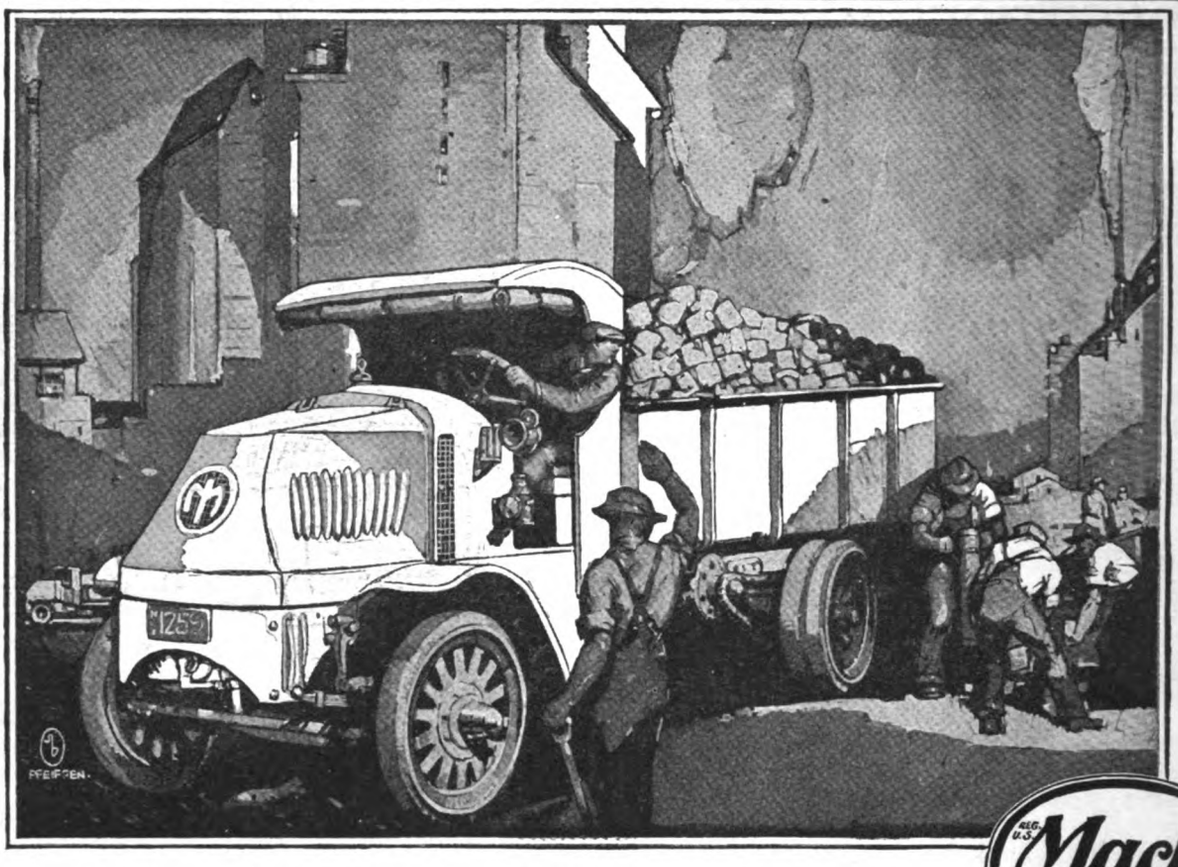

Mack TRUCKS

"Selling Points—Did You Say?"

WELL, in the first place the Mack is a manufactured truck. It is built to meet the highest standard of efficiency, not price.

In the second place, Mack dealers can point to a record of things achieved by their product that is without an equal in motor truck history. And the reputation of the Mack isn't known by only those intimately associated with the industry but by motor truck users the country over.

Which brings us to the nation-wide selling organization that is pushing the Mack for all it's worth. And it's worth every bit of enthusiasm every Mack salesman has for it.

And back of it all, there are three modern, humming factories located at Allentown, Pa., Plainfield, N. J., and New Brunswick, N. J., which are producing a continuous supply of Mack trucks.

We couldn't tell the whole Mack story in five pages of this magazine. But we can give some mighty interesting particulars if you'll write us. There may be some available territory in your vicinity.

INTERNATIONAL MOTOR COMPANY
25 Broadway, New York City

Branches owned by this company operate under the titles of: "MACK MOTOR TRUCK COMPANY" and "MACK-INTERNATIONAL MOTOR TRUCK CORPORATION."

PERFORMANCE COUNTS

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Investigate LATEST "WHITNEY"

LATEST ROLLER CHAINS HAVE SPECIAL QUALITY
SOLID ROLLS AND OTHER IMPORTANT IMPROVEMENTS

HIGH EFFICIENCY
ROLLER AND SILENT TYPE
CHAINS
also *Low* Cost per *Thousand Miles* of Service

Front End Motor Chain Drives

EXCEPTIONAL MILEAGE AND NEVER KNOWN
TO SKIP THE SPROCKET TEETH

THE WHITNEY MFG. CO.
HARTFORD, CONNECTICUT, U. S. A.

Christmas Greetings to the Truck Industry

In the hustle and bustle of business
With its saving and slaving and grind
We're apt to accredit successes
To the works of our hands and mind.

But this space is taken to tell you
That we feel that the credit is due
For the progress we've made and the
good will we've built,
To the friendship of such folks as you.

THE HEIL CO.
Milwaukee . . Wisconsin

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Lee Automatic Dump Body

DUMPS WITHOUT POWER

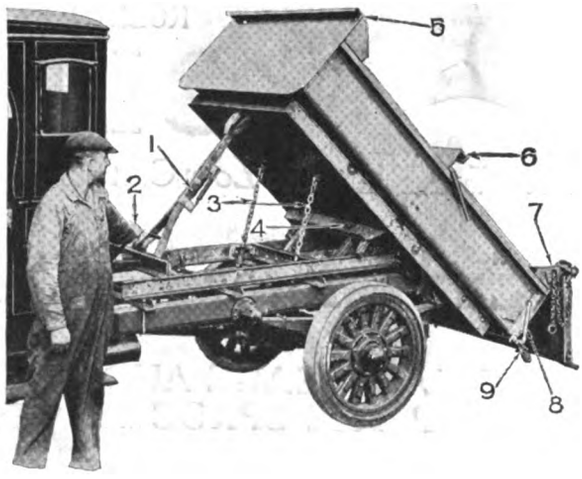
1 **Folding Standard** — automatically locks body in dumping position.

2 **Control Lever**—automatically locks body in traveling position.

3 **Check Chains**—Prevent malalignment of body on uneven ground.

4 **Roller Segment** — rolls on a low track, giving low overall height.

5 **High Dumping Angle**—moves the stickiest material quickly.



6 **Partition**—divides the load for multiple batch hauling. ($25 extra).

7 **Spreader**—lays gravel, stone, etc., evenly and efficiently.

8 **Gate Control** — affords automatic and manual operation.

9 **Lowest Dumping Point** — gives ample ground clearance.

ELIMINATE TRUCK TROUBLES

LEE BODIES eliminate half the total troubles of a dump truck, as it does not use a HOIST with its numerous complicated parts that are subject to improper installation, adjustments and wear, road shocks, vibrations, exposure to dirt, dust, weather, etc., etc.

INCREASE DAILY TONNAGE

The conventional type of mechanical-operated dumping body is a highly complicated mechanism, high in first cost, high in selling price, and high in up-keep expense, and the very quality that makes its production cost unnecessarily high—its great and needless complexity of construction—is the quality that makes it undependable, liable to frequent service interruptions and a source of lasting grief to buyer and seller alike.

SAVE ON FIRST COST

By eliminating the complications inherent in power-operated dumping bodies, an economy in first cost of about 40% has been made possible, while every advantage of these types has been retained without their disadvantages — costs of maintenance and loss of time for repairs, excessive weight and unnecessary high price.

LEE TRAILER AND BODY COMPANY, 2343 S. La Salle Street, Chicago, Ill., U. S. A.

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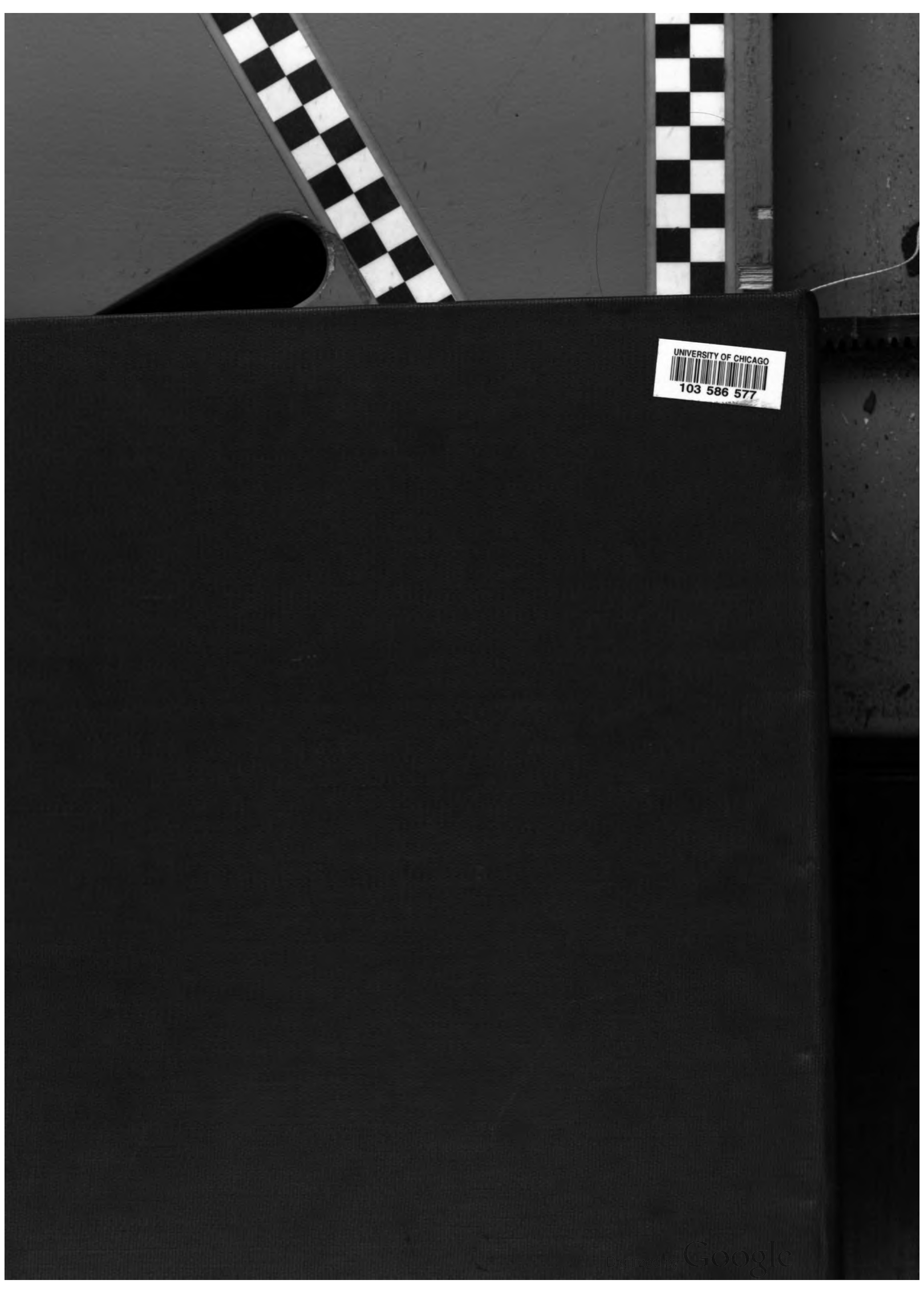
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